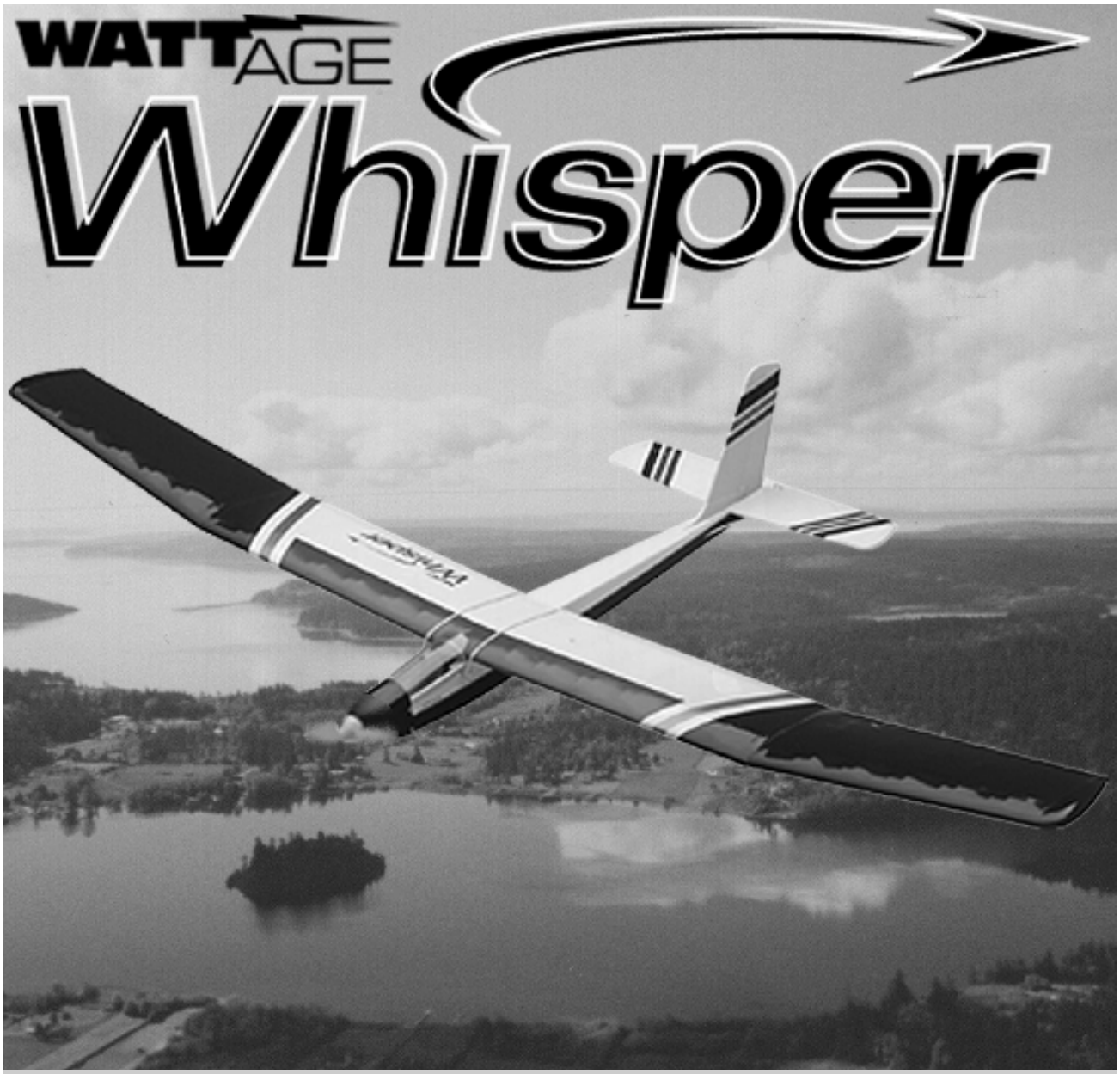


Instructions for Final Assembly

The Wattage Whisper is a 2-meter electric powered glider utilizing all balsa and plywood built up construction techniques. The polyhedral wing design is a flat bottom, Phillips Entry style that is incredibly stable throughout the entire flight envelope and produces good lift. The wing is built of true D-Tube construction with balsa sheeting and shear webbing for great strength. The fuselage is built up light plywood and balsa and the tail feathers are built up of lightweight balsa. Lightening holes have been strategically placed to remove unnecessary weight without compromising strength. All this adds up to an airplane that climbs out with authority and will also do well in the thermals. Included is a 540 direct drive electric motor with folding propeller assembly and all wiring preinstalled at the factory. All necessary hardware is included to finish the kit, including clevises, pushrods, control horns and all of the necessary nuts and bolts, even a molded cowling and canopy! We hope you will enjoy building and flying the Whisper as much as we have enjoyed designing it for you. Please fill out the Product Evaluation Sheet at the end of this manual. We would love to hear your comments regarding the Whisper.

Version V1.0 9-99 MTN
All Contents © Copyright 1999

TABLE OF CONTENTS

Our Recommendations....2
Metric Conversion Chart....2
Kit Contents....3
Additional Items Required....4
Tools and Supplies Needed....4
Full Size Hardware Drawings....5
Motor Break-in....6
Wing Assembly....7
- Laminating the Dihedral Braces....7
- Installing the Outboard Dihedral Braces....7
- Joining the Outboard Wing Panels....8
- Joining the Wing Halves....8
- Installing the Striping Tape....9
- Installing the Wing Hold Down Strip....10

Wing Installation....10
- Installing the Front Wing Dowels....10
- Installing the Rear Wing Dowel....11
- Installing the Wing....11

Horizontal Stabilizer Installation....11
- Aligning the Horizontal Stabilizer....11
- Mounting the Horizontal Stabilizer....12
- Hinging the Elevator....12

Vertical Stabilizer Installation....13
- Hinging the Rudder....13
- Aligning the Vertical Stabilizer....13
- Mounting the Vertical Stabilizer....14
- Installing the Tail Fairing....14

Servo Installation....15
- Installing the Servo Tray....15
- Installing the Servos....15

Pushrod Installation....15
- Installing the Pushrod Housings....15
- Installing the Elevator Control Horn....16
- Installing the Rudder Control Horn....16
- Installing the Elevator Pushrod....17
- Installing the Rudder Pushrod....18

Motor Installation....18
- Installing the Motor....18

Cowl and Propeller Installation....19
- Joining the Cowl Halves....19
- Installing the Propeller....20
- Installing the Cowl....20

Canopy Installation....21
- Aligning the Canopy....21
- Mounting the Canopy....21

Landing Skid Installation....22
- Installing the Landing Skid....22

Final Assembly....22
- Installing the Receiver....22
- Installing the Switch....22
- Installing the Receiver and ESC....22

Balancing....23
Control Throws....23
Flight Preparation....23
- Preflight Check....24

ABC's of Flying....24
Basics of Flight....25
Basics of Thermal Flying....27
Glossary of Terms....28
Notes....29
Product Evaluation Sheet....30

Wattage guarantees this kit to be free from defects in both material and workmanship, at the date of purchase. This does not cover any components parts damaged by use, misuse or modification. **In no case shall Wattage's liability exceed the original cost of the purchased kit.**

In that Wattage has no control over the final assembly or material used for final assembly, no liability shall be assumed for any damage resulting from the use by the user of the final user-assembled product. By the act of using the final user-assembled product, the user accepts all resulting liability.

To make your modeling experience totally enjoyable, we recommend that you get experienced, knowledgable help with assembly and during your first flights. Your local hobby shop has information about flying clubs in your area whose membership includes qualified instructors. You can also contact the AMA at the address below.

Academy of Model Aeronautics
5151 East Memorial Drive
Muncie, IN. 47302-9252
(800) 435-9262
www.modelaircraft.org

OUR RECOMMENDATIONS

The following items are our recommendations to help you in deciding which types of accessories to purchase for your new Whisper. We have tested all of these items, and many others with the Whisper, and found that these will offer the best in performance, reliability and economy.

RADIO SYSTEM

The Wattage Whisper will require a minimum 3 channel radio control system that includes two servos. For this we recommend the Hitec Focus 3 channel radio with two standard servos. If you already own a radio system, or want to purchase a radio system that will be more upgradeable in the future, a four or more channel radio with two standard servos will work fine. Our recommendation would be the Hitec Flash 4X FM Computer radio. This is a very good system that offers the ability to grow as your experience grows. A standard size receiver will fit in the Whisper with no problems, so the purchase of an aftermarket micro or mini receiver is unnecessary.

MOTOR CONTROLLER

To operate the motor, we highly suggest using a proportional electronic speed control that features B.E.C. circuitry, auto-cutoff and a brake. B.E.C. circuitry allows you to eliminate the receiver battery and uses the motor battery to control both the motor and the servos. Eliminating the receiver battery provides a great weight savings which effectively increases performance. The auto-cutoff feature turns off the motor when the voltage in the battery drops too low to operate the radio system safely. This guarantees safe operation throughout the entire flight. The brake feature electronically causes the motor to stop rotating allowing the folding propeller to fold properly. This will prevent excessive strain and current draw in the electronic components, specifically the motor controller. To obtain all of these features, we suggest using one of the Wattage Electronic Speed Controls available for 540 and 05 size motors. If you opt not to use a proportional electronic speed control, an electronic switch such as the Hitec Motor Controller SP-1003 (part # 41003) is an economical way to turn the motor on and off. This switch does not offer any proportional speed, only off or full power.

MOTOR BATTERY

The battery you choose should be a 7 cell (8.4v) Nickel Cadmium battery pack. Choose a battery pack between 1100Mah and 2000Mah. A premade R/C car battery such as the Trinity 1400Mah flat pack (part # 842010) works very good. A 6 cell battery pack will fly the Whisper, however climb out will be slower than if you use a 7 cell pack. Today's new generation of Sub-C 3000Mah Nickel Metal Hydride batteries also perform well, however require a linear charger featuring adjustable peak cutoff voltage.

BATTERY CHARGER

Because the battery powers both the motor and the radio system, we suggest using an automatic Delta Peak charger such as the Promax Black Widow Peak Charger (part # 35036) or the Promax Activator Digital Peak Charger (part # 885650). It is vital to the Whisper's flying performance that the battery pack be fully charged every flight, so using a peak charger is very important.

METRIC CONVERSION CHART

To convert inches into millimeters: **Inches x 25.4 = MM**

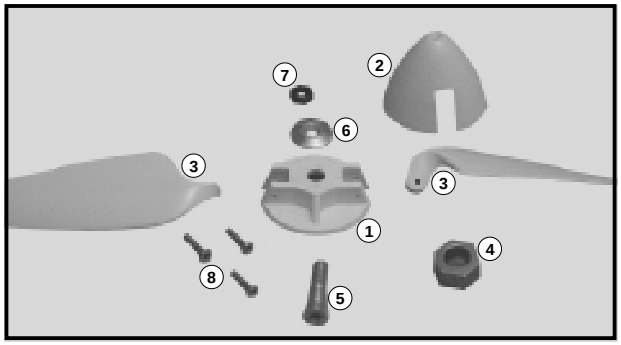
1/64”	=	.4mm	3/16”	=	4.8mm	1”	=	25.4mm	21”	=	533.4mm
1/32”	=	.8mm	1/4”	=	6.4mm	2”	=	50.8mm	24”	=	609.6mm
1/16”	=	1.6mm	3/8”	=	9.5mm	3”	=	76.2mm	30”	=	762.0mm
3/32”	=	2.4mm	1/2”	=	12.7mm	6”	=	152.4mm	36”	=	914.4mm
1/8”	=	3.2mm	5/8”	=	15.9mm	12”	=	304.8mm			
5/32”	=	4.0mm	3/4”	=	19.0mm	18”	=	457.2mm			

This instruction manual is designed to help you build a straight, great flying airplane. Please read this manual thoroughly before beginning assembly of your new Wattage Whisper ARF. Use the parts photos below to identify and separate all of the parts before beginning assembly.

****KIT CONTENTS**** We have organized the parts as they come out of the box for better identification during assembly. Each photo below represents parts that are required for each step in the assembly process. We recommend that you regroup the parts in the same manner. This will ensure you have all of the parts required before you begin assembly and will also help you familiarize yourself with each part. The corresponding part number is listed first, then the quantity of the part is listed, along with it's description.

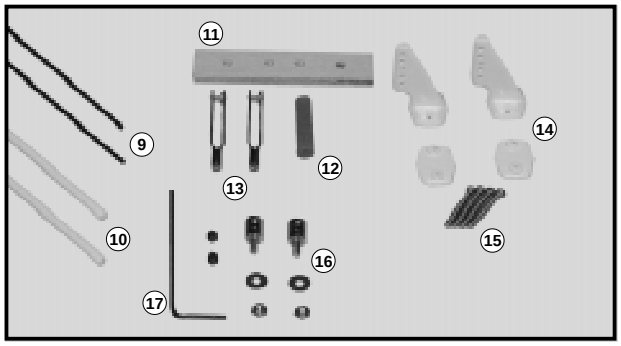
KIT CONTENTS

PROPELLER ASSEMBLY



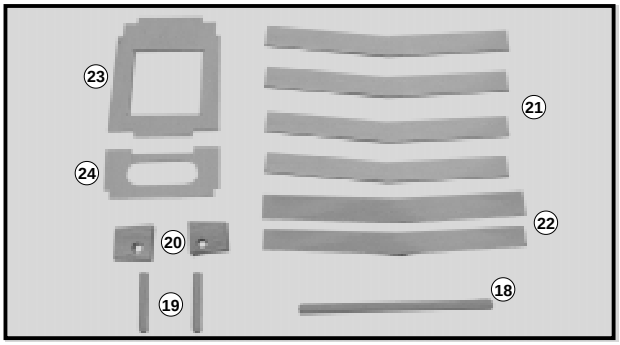
① ❑ {1} Nylon Propeller Hub
② ❑ {1} Nylon Spinner Cone
③ ❑ {2} Propeller Blade Halves
④ ❑ {1} Tapered Aluminum Hex Adapter
⑤ ❑ {1} Threaded Adapter
⑥ ❑ {1} Propeller Washer
⑦ ❑ {1} Propeller Nut
⑧ ❑ {3} 2mm x 12mm Smooth Shank Machine Screws

PUSHROD ASSEMBLIES



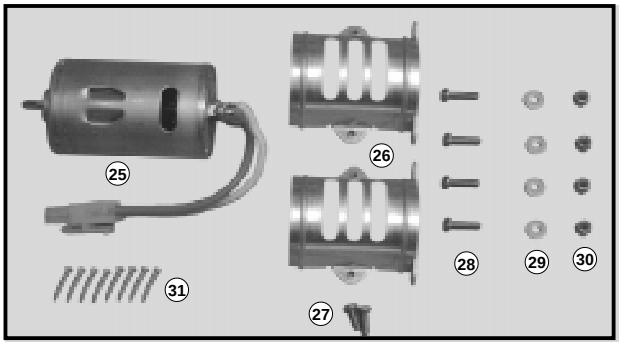
⑨ ❑ {2} 2mm x 610mm Threaded Pushrods
⑩ ❑ {2} 3mm x 640mm Nylon Pushrod Housings
⑪ ❑ {1} 3mm x 55mm x 14mm Pushrod Support
⑫ ❑ {1} 8mm x 20mm Clear Tubing
⑬ ❑ {2} Metal Clevises
⑭ ❑ {2} Nylon Control Horns w/ Backplates
⑮ ❑ {4} 2mm x 15mm Machine Screws
⑯ ❑ {2} Adjustable Servo Connector Assemblies
⑰ ❑ {1} Hex Wrench

WOOD PARTS



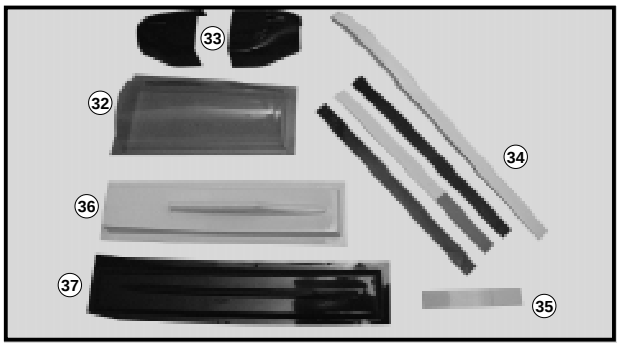
⑱ ❑ {1} 6mm x 95mm Rear Wing Hold Down Dowel
⑲ ❑ {2} 6mm x 32mm Front Wing Hold Down Dowels
⑳ ❑ {2} Front Wing Hold Down Dowel Blocks
㉑ ❑ {4} Outboard Wing Panel Dihedral Braces
㉒ ❑ {2} Inboard Wing Panel Dihedral Braces
㉓ ❑ {1} Servo Tray
㉔ ❑ {1} Servo Tray Support

MOTOR ASSEMBLY



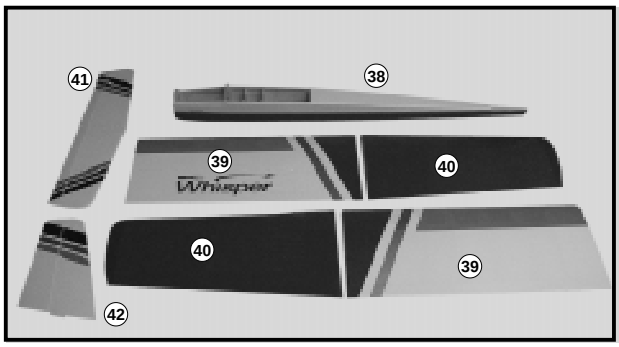
㉕ ❑ {1} Electric Motor
㉖ ❑ {2} Motor Mount Halves
㉗ ❑ {2} 3mm x 8mm Machine Screws
㉘ ❑ {4} 3mm x 12mm Machine Screws
㉙ ❑ {4} 3mm Flat Washers
㉚ ❑ {4} 3mm Nylon Insert Nuts
㉛ ❑ {8} 2mm x 12mm Wood Screws

MOLDED PLASTIC PARTS



- ㉜ ❑ {1} Molded Plastic Canopy
- ㉝ ❑ {2} Molded Plastic Cowl Halves, Right & Left
- ㉞ ❑ {1} Trim Tape (1 White, 2 Blue, 1 Red & White)
- ㉟ ❑ {1} 15mm x 100mm Plastic Strip
- ㊱ ❑ {1} Molded Plastic Tail Fairing
- ㊲ ❑ {1} Molded Landing Skid

MAIN AIRFRAME ASSEMBLIES



- ㊳ ❑ {1} Fuselage
- ㊴ ❑ {2} Inboard Wing Panels
- ㊵ ❑ {2} Outboard Wing Panels
- ㊶ ❑ {1} Horizontal Stabilizer w/Elevator &Hinges
- ㊷ ❑ {1} Vertical Stabilizer w/Rudder & Hinges

ADDITIONAL ITEMS REQUIRED

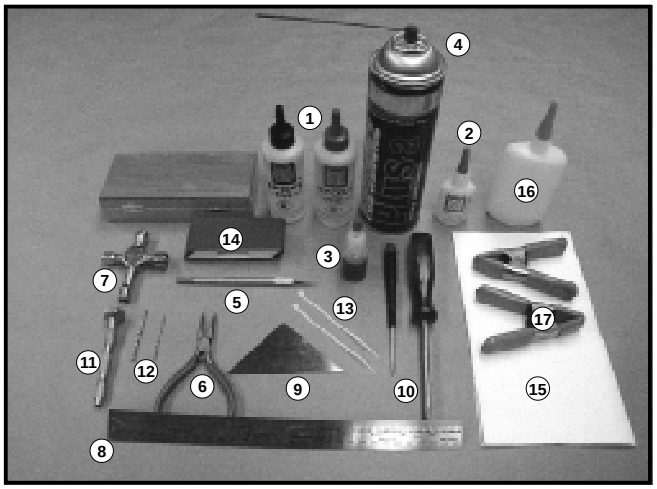
Recommended

- ① ❑ Hitec Focus 3 AM Single Stick Radio w/2 Servos
  Requires 8 AA Batteries # AC8AA
- ② ❑ Wattage ESC with BEC and Brake
- ③ ❑ Trinity 7 Cell 1400 Mah Amp Max Battery # 842010
- ④ ❑ Promax Black Widow Peak Charger # 350360
- ⑤ ❑ Arco # 64 Rubber Bands # 24649

Optional Upgrades

- ❑ Hitec Flash 4X FM Computer radio w/2 Servos
- ❑ Trinity 7 Cell 1700Mah Battery # 1779
- ❑ Promax Activator Digital Peak Charger # 885650

TOOLS AND SUPPLIES NEEDED

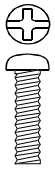


(Some Items Listed are Not Shown)

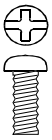
- ① ❑ Kwik Bond 5 Minute Epoxy # 887560
- ② ❑ Kwik Bond Thick C/A # 887510
- ③ ❑ Trinity Bushing Oil # 4049
- ④ ❑ Performance Plus Motor Spray # 4000
- ⑤ ❑ Excell Modeling Knife # 16018
- ⑥ ❑ Pliers
- ⑦ ❑ 8mm Wrench or Adjustable Wrench
- ⑧ ❑ Straight Edge Ruler
- ⑨ ❑ Builders Triangle
- ⑩ ❑ # 0 and # 2 Phillips Screwdrivers
- ⑪ ❑ Hand or Electric Drill
- ⑫ ❑ 1/16”, 5/64”, 1/8” and 1/4” Drill Bits
- ⑬ ❑ TS Racing Zip Ties # TS-006B
- ⑭ ❑ 220 Grit Sandpaper w/Sanding Block
- ⑮ ❑ Paper Towels
- ⑯ ❑ Rubbing Alcohol
- ⑰ ❑ Clamps
- ❑ Pen
- ❑ Masking Tape

FULL SIZE DRAWINGS

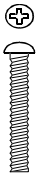
Listed below are full size drawings of the hardware included with the Whisper. Use these drawings to familiarize yourself with each piece. Please refer back to this page to locate the proper hardware items when they are needed for a particular assembly step.



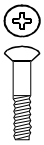
3mm x 12mm Machine Screw (Quantity 4)



3mm x 8mm Machine Screw (Quantity 2)



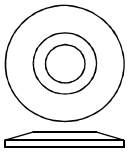
2mm x 15mm Machine Screw (Quantity 4)



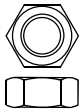
2mm x 12mm Smooth Shank Machine Screw (Quantity 3)

3mm Nylon Insert Nut (Quantity 4)

3mm Flat Washer (Quantity 4)



Propeller Washer (Quantity 1)



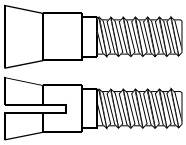
Propeller Nut (Quantity 1)

Servo Connector Body (Quantity 2-Part of Servo Connector Assembly)

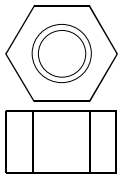
2mm Set Screw (Quantity 2-Part of Servo Connector Assembly)

2mm Hex Nut (Quantity 2-Part of Servo Connector Assembly)

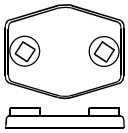
2mm x 12mm Wood Screw (Quantity 8)



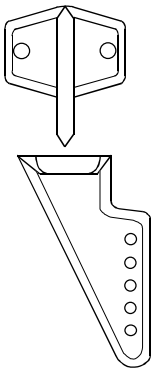
Aluminum Prop Shaft Adapter (Quantity 1)



Tapered Hex Adapter (Quantity 1)



Nylon Backplate (Quantity 2)



Nylon Control Horn (Quantity 2)

Metal Clevis (Quantity 2)

****IMPORTANT**** We have included a glossary of terms beginning on page # 28. Use this glossary if you come across a term that is unfamiliar. Terms throughout this instruction book that are written in **bold** are listed in the glossary.

If you should find a part missing or have questions about assembly, please call or write to the address below:

Wattage Customer Care
18480 Bandilier Circle
Fountain Valley, CA. 92728
Phone: (714) 963-0329
Fax: (714) 964-6236
E-Mail: service@globalhobby.com

****SUGGESTION**** To avoid scratching your new airplane, do not unwrap the pieces until they are needed for assembly. Cover your workbench with an old towel or brown paper, both to protect the aircraft and to protect the table. Keep a couple of jars or bowls handy to hold the small parts after you open the plastic bags.

****NOTE**** Please trial fit all of the parts. Make sure you have the correct parts and that they fit and are aligned properly before gluing! This will assure proper assembly. Since the Whisper is hand made from natural materials, every airplane is unique and minor adjustments may have to be made. However, you should find the fit superior and assembly simple.

MOTOR BREAK-IN

❑ 1) Set out the electric motor, battery, charger, radio system and the electronic speed control onto your workbench.

❑ 2) Charge the motor battery using the **peak charger** according to the charger's instructions. Install the 8 AA batteries into the transmitter (Focus 3) or fully charge the transmitter batteries (radios using rechargeable batteries).

❑ 3) Once the batteries are ready, plug the two **servos** and electronic speed control into the **receiver**. Plug the motor lead into the speed control lead.

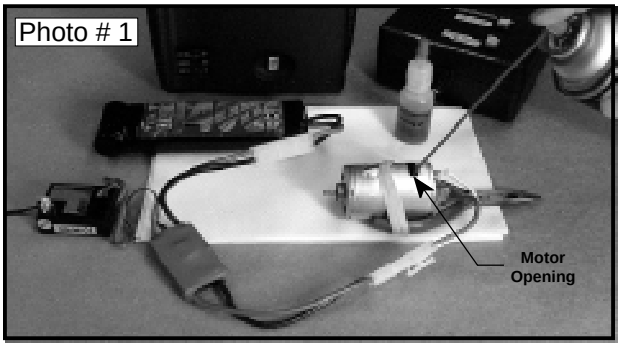
⚠ The prewired plastic connector on the motor is called a Tamiya Connector. Most electronic speed controls also use this style of connector, but some do not. If your speed control does not have this type of connector, you will need to change the connector to a compatible one at this time.

❑ 4) Set the motor, without the propeller installed, between the handles of a pair of pliers. Secure the motor to the handles using three # 64 rubber bands. This will keep the motor secure enough for the break-in procedure.

❑ 5) Turn on the **transmitter** and then plug the motor battery into the speed control. If the motor immediately turns on, use the throttle stick (on the Focus 3, the throttle lever is on the back of the transmitter) to turn off the motor.

❑ 6) With the motor turned off, test the operation of the servos. They should move when you move the control stick.

❑ 7) Carefully spray a couple of light sprays of motor spray inside the motor opening and apply a small drop of bushing oil onto each of the two motor bushings. **See photo # 1 below.**



❑ 8) Using paper towels, wipe off the excess oil.

❑ 9) Slowly turn on the motor using the transmitter throttle lever. Position the throttle lever to about 1/3 throttle and let the motor run. While the motor is running, apply a light spray of motor spray inside the motor opening once every minute, followed by a drop of oil on each bushing. Do this until the battery is fully discharged (i.e. the motor stops).

⚠ If you have chosen a on-off only **motor controller**, complete the same process but only run the motor in two minute intervals, letting the motor cool between each interval.

❑ 10) After the battery has discharged and the motor has stopped, spray motor spray through the motor opening until the fluid runs clear. Apply oil to both of the bushings and wipe away all of the excess using paper towels.

By completing these steps, you've seated the motor bushings and brushes, tested the radio system, and **cycled** the motor battery once. The motor battery should be cycled 3 times before the plane is flown. Typically, nicads must be cycled 3-5 times before they work to their maximum performance.

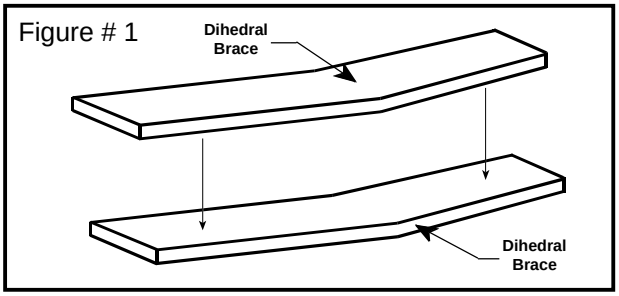
WING ASSEMBLY

PARTS REQUIRED

- ❑ {2} Inboard Wing Panels
- ❑ {2} Outboard Wing Panels
- ❑ {1} Trim Tape (1 White, 2 Blue, 1 Red & White)
- ❑ {1} 15mm x 100mm Plastic Strip
- ❑ {4} Outboard Wing Panel Dihedral Braces
- ❑ {2} Inboard Wing Panel Dihedral Braces

LAMINATING THE DIHEDRAL BRACES

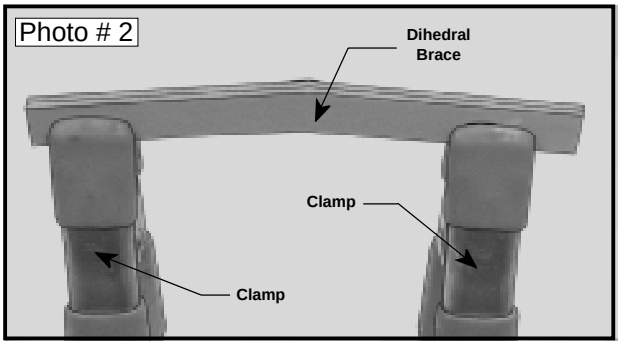
❑ 1) Lay out the six **dihedral braces** onto your workbench. Four of the braces are cut at a deeper angle than the two others. These four are the dihedral braces used to join the two outboard wing panels to the two inboard wing panels and will be laminated together to make two braces. The other two dihedral braces are used to join the two inboard wing panels and will be laminated together to make one brace. **See figure # 1 below.**



❑ 2) Mix up a small amount of Kwik Bond 5 Minute **Epoxy**. Working with the two inboard braces, apply a thin layer of epoxy to only one side of only one of the two braces.

For the epoxy to work properly, mix equal amounts of part A and part B. Mix the two parts together for about 45 seconds until they are both thoroughly mixed.

❑ 3) Carefully place the brace, glue side down, onto the second brace. Line up the edges of the two braces and use clamps to hold them together tight. Use a paper towel and rubbing alcohol to remove any excess epoxy before it cures. **See photo # 2 below.**



❑ 4) Repeat steps # 2 - # 3 to laminate together the four outboard dihedral braces. Remember to make two sets. You should now have two sets of outboard dihedral braces and one center dihedral brace.

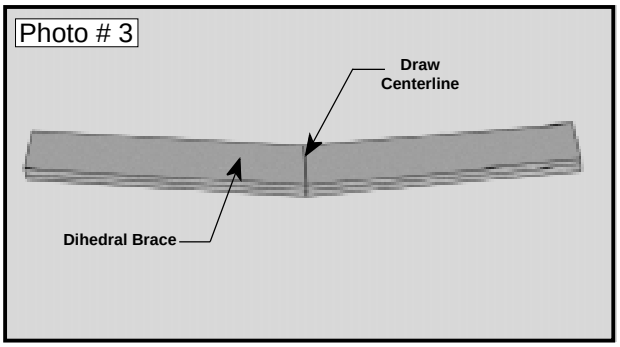
❑ 5) After the epoxy has fully cured, use 220 grit sandpaper with a sanding block and carefully sand the edges of the three dihedral braces smooth and straight. Be careful not to take off too much material.

❑ 6) Use a pen and label the two outboard dihedral braces and the center dihedral brace. This will help you keep from getting them mixed up.

The two braces cut at a deeper angle are for the outboard wing panels. The remaining brace with the shallower angle is for the center wing panels.

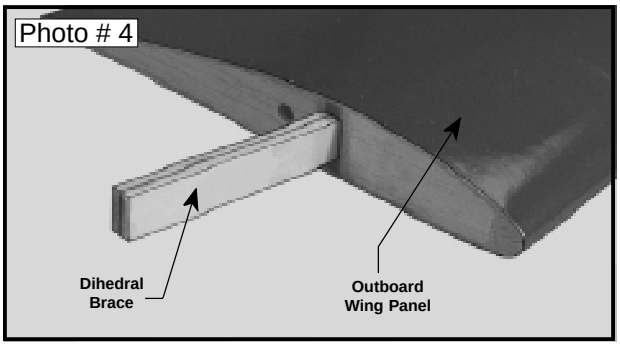
INSTALLING THE OUTBOARD DIHEDRAL BRACES

❑ 7) Using a ruler and a pen, locate and mark the centerlines of the two outboard dihedral braces. Draw one vertical line at this location on each side of both of the braces. **See photo # 3 below.**



❑ 8) Working with one outer wing panel and one outer dihedral brace for now, test fit the dihedral brace into the plywood box in the outer wing panel. The brace should slide into the wing panel up to the centerline. If it does not, remove the brace and lightly sand the edges and tips of the brace until the proper fit is obtained. **See photo # 4 below.**

Photo # 4



⚠ The dihedral brace is cut in the shape of a "V". The "V" shape should face the *top* surface of the wing (curved surface) when the brace is installed.

❑ 9) When satisfied with the fit of the dihedral brace, remove it from the wing panel.

❑ 10) Mix a generous amount of Kwik Bond 5 Minute Epoxy. Apply a thin layer of epoxy inside the plywood dihedral brace box and to only half of the dihedral brace. Make sure to cover the top and bottom as well as the sides, and use enough epoxy to fill any gaps.

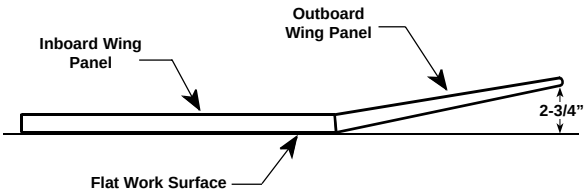
❑ 11) Slide the dihedral brace into the plywood box up to the centerline. Remove any excess epoxy before it dries using a paper towel and rubbing alcohol. Allow the epoxy to cure before proceeding.

❑ 12) Repeat steps # 8 - # 11 to install the second outboard dihedral brace into the second outboard wing panel.

JOINING THE OUTBOARD WING PANELS

❑ 13) Working with the right outboard wing panel and the right inboard wing panel for now, test fit the two wing panels together. With the inboard panel flat on your workbench, the tip of the outer wing panel should be 2-3/4" off the surface of the workbench. This measurement should be taken at the trailing edge of the outer panel where the tip begins. Use books or a scrap piece of wood to hold the wing panel in the proper position. It is also helpful to weight down the inboard panel so it does not move. Magazines work good for this. **See figure # 2 at top right.**

Figure # 2



⚠ The wing panels should fit together tight with little or no gaps in the joint. If the joint is not tight, remove the wing panels and lightly sand the edges and tips of the dihedral brace. Test fit the wing panels together once more. Repeat this until you are satisfied with the fit of the wing panels.

❑ 14) Mix a generous amount of Kwik Bond 5 Minute Epoxy. Apply a thin layer of epoxy to the exposed half of the dihedral brace, the inside of the plywood box in the inboard wing panel and the *entire surface of both ribs.* Make sure to use enough epoxy to fill any gaps.

❑ 15) Slide the two wing panels together and carefully align them at the leading and trailing edges. Align the wing panels as done in step # 13, keeping the inboard panel flat and using a book or scrap wood to hold the outboard panel at the proper height. Wipe away any excess epoxy using a paper towel and rubbing alcohol and allow the epoxy to fully cure before handling the wing.

⚠ After the epoxy has completely cured, use a ruler and check the final dihedral angle of the outboard panel. If it is not exactly 2-3/4", that is okay. When you join the opposite two panels together, make sure that angle is the same angle as the first. To help visualize this you can place the two sets of wing panels next to each other to double check your work.

❑ 16) Repeat steps # 13 - # 15 to join the left outboard wing panel and the left inboard wing panel. Once that is complete you should have one right and one left wing half.

JOINING THE WING HALVES

❑ 17) Using a ruler and a pen, locate and mark the centerline of the center dihedral brace. Draw one vertical line at this location on each side of the brace.

❑ 18) Working with the right wing half for now, test fit the dihedral brace into the plywood box in the root rib. The brace should slide into the wing up to the centerline. If it does not, remove the brace and lightly sand the edges and tips until the proper fit is obtained.

The dihedral brace is cut in the shape of a "V". The "V" shape should face the *top* surface of the wing (curved surface) when the brace is installed.

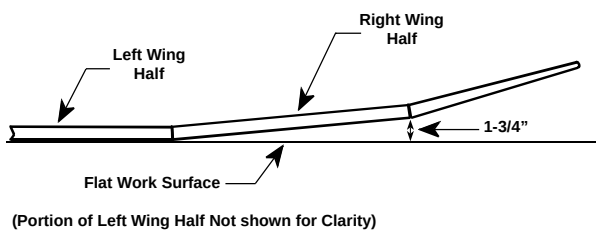
❑ 19) When satisfied with the fit of the dihedral brace, remove it from the wing half.

❑ 20) Mix a generous amount of Kwik Bond 5 Minute Epoxy. Apply a thin layer of epoxy inside the plywood dihedral brace box and to only half of the dihedral brace. Make sure to cover the top and bottom as well as the sides, and use enough epoxy to fill any gaps.

❑ 21) Slide the dihedral brace into the plywood box up to the centerline. Remove any excess epoxy before it dries using a paper towel and rubbing alcohol. Allow the epoxy to cure before proceeding.

❑ 22) Test fit the two wing halves together. With the inboard panel of the left wing half flat on your workbench, the joint in the right wing half should be 1-3/4" off the surface of the workbench. This measurement should be taken at the trailing edge where the outboard and inboard panels were joined. Use books or a scrap piece of wood to hold the wing half in the proper position. It is also helpful to weight down the left wing half so it does not move. **See figure # 3 below.**

Figure # 3



The wing halves should fit together tight with little or no gaps in the joint. If the joint is not tight, remove the wing halves and lightly sand the edges and tips of the dihedral brace. Test fit the wing halves together once more. Repeat this until you are satisfied with the fit.

❑ 23) Mix a generous amount of Kwik Bond 5 Minute Epoxy. Apply a thin layer of epoxy to the exposed half of the dihedral brace, the inside of the plywood box in the root rib and the *entire surface of both root ribs.* Make sure to use enough epoxy to fill any gaps.

❑ 24) Slide the two wing halves together and carefully align them at the leading and trailing edges. Align the wing halves as done in step # 22, keeping the inboard panel flat and using a book or scrap wood to hold the right wing half at the proper height. Wipe away any excess epoxy using a paper towel and rubbing alcohol and allow the epoxy to fully cure before handling the wing.

❑ 25) When the epoxy has fully cured, double check all three wing joints. If any gaps are present, mix a small amount of Kwik Bond 5 Minute Epoxy and carefully fill any remaining gaps. Remove the excess epoxy using a paper towel and rubbing alcohol and allow the epoxy to fully cure.

INSTALLING THE STRIPING TAPE

❑ 26) Using a modeling knife, cut the white self adhesive trim tape into three 9" long pieces.

❑ 27) Turn the wing upside down. Remove the paper backing from the trim tape and carefully apply the tape over the three joints on the bottom of the wing. Begin at the leading edge and carefully work back to the trailing edge. Use a modeling knife to remove the excess trim tape.

❑ 28) Turn the wing right side up. Remove the paper backing from the blue trim tape and carefully apply the tape over the two outboard joints on top of the wing. Begin at the leading edge and carefully work back toward the trailing edge. Use a modeling to remove the excess material from the leading and trailing edges.

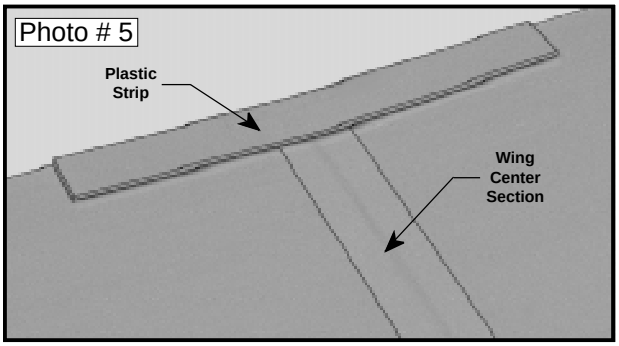
❑ 29) Remove the paper backing from the red and white piece of trim tape and carefully apply the tape over the center section joint on top of the wing. Begin at the leading edge and carefully work back toward the trailing edge, aligning the red on the tape with the red on the wing. Use a modeling to remove the excess material from the leading and trailing edges.

INSTALLING THE WING HOLD DOWN STRIP

❑ 30) Using a ruler and a pen, measure and mark the center of the 15mm x 100mm white plastic strip.

❑ 31) Position the strip on top of the wing. The back edge of the strip should be flush with the trailing edge of the wing and the centerline of the strip should be lined up with the centerline of the wing. **See photo # 5 below.**

Photo # 5



❑ 32) While holding the strip in place, use a pen and carefully draw around the strip to outline it onto the wing surface.

❑ 33) Remove the plastic strip. Using a modeling knife, carefully remove the **covering** from just inside the outline. Use 220 grit sandpaper and lightly sand the bottom of the plastic strip to roughen the surface.

❑ 34) Mix up a small amount of Kwik Bond 5 Minute Epoxy. Apply a thin layer to the bottom side of the strip and realign it on the wing. Remove any excess epoxy using a paper towel and rubbing alcohol. Hold the strip in place using pieces of masking tape until the epoxy has fully cured.

WING INSTALLATION

PARTS REQUIRED

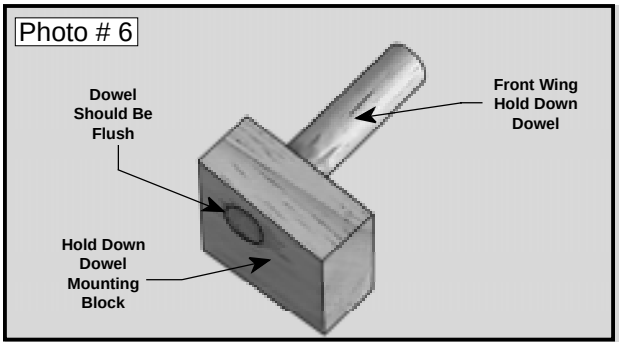
❑ {1} 6mm x 95mm Rear Wing Hold Down Dowel
❑ {2} 6mm x 32mm Front Wing Hold Down Dowels
❑ {2} Front Wing Hold Down Dowel Mounting Blocks

INSTALLING THE FRONT WING DOWELS

❑ 1) Using a modeling knife, remove the covering from over the two predrilled wing hold down dowel holes in front of the wing saddle. One hole is located on each side of the fuselage 4-7/8" behind the front of the fuselage and 1/2" down from the top of the fuselage.

❑ 2) Test fit one of the 6mm x 32mm front **wing hold down dowels** into the predrilled hole in one front wing hold down dowel mounting block. One end of the dowel should be flush with the side of the block. **See photo # 6 below.**

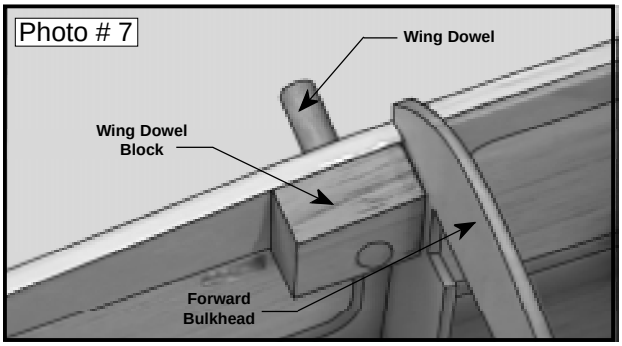
Photo # 6



❑ 3) When satisfied with the fit, remove the dowel and mix a small amount of Kwik Bond 5 Minute Epoxy. Apply a thin layer of epoxy into the predrilled hole in the block. Reinstall the dowel, keeping one end of the dowel flush with the side of the block. Remove any excess epoxy using a paper towel and rubbing alcohol and allow the epoxy to fully cure.

❑ 4) Insert the dowel and block assembly through the predrilled hole from inside the fuselage. The dowel slides through the predrilled hole in the side of the fuselage and the block should be pushed firmly against the fuselage side and the forward bulkhead. **See photo # 7 below.**

Photo # 7



If you look carefully at the block, you will notice that the top of the block is cut at an angle. This angle matches the angle of the top of the fuselage. Depending on which side of the block you installed the dowel into, will determine which side of the fuselage the block is glued to. When you make the second dowel and block assembly later, make sure you install the dowel on the opposite side as the first. This way you will have made one right and one left assembly.

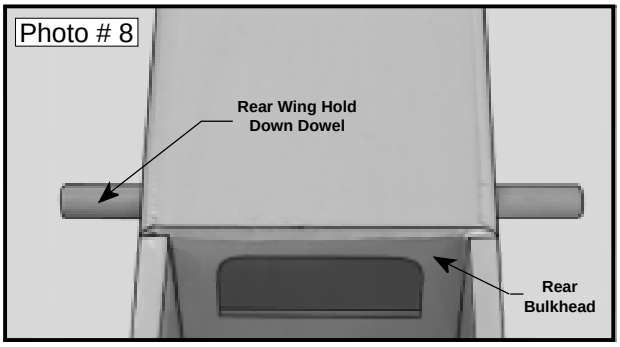
❑ 5) Remove the assembly and mix a small amount of Kwik Bond 5 Minute Epoxy. Apply a thin layer of glue to the inside of the predrilled hole in the fuselage side and to the gluing surfaces of the block. Reinstall the block and remove any excess epoxy using a paper towel and rubbing alcohol. Allow the epoxy to fully cure before proceeding.

❑ 6) Repeat steps # 2 - # 5 to assemble and install the second front wing hold down dowel assembly.

INSTALLING THE REAR WING DOWEL

❑ 7) Using a modeling knife, remove the covering from over the two predrilled wing hold down dowel holes in back of the wing saddle. One hole is located on each side of the fuselage 13-3/4" behind the front of the fuselage and 3/8" down from the top of the fuselage.

❑ 8) Slide the 6mm x 95mm rear wing hold down dowel through the predrilled holes and center the dowel. The ends of the dowel should protrude from the fuselage sides equal amounts. **See photo # 8 below.**



❑ 9) When satisfied with the fit, place a mark on each side of the dowel where it exits the fuselage. Remove the dowel.

❑ 10) Mix up a small amount of Kwik Bond 5 Minute Epoxy. Apply a thin layer of epoxy to the inside of the two predrilled holes. Slide the dowel back into place and align the marks on the dowel with the fuselage sides. Remove any excess epoxy using a paper towel and rubbing alcohol. Allow the epoxy to fully cure before proceeding.

INSTALLING THE WING

❑ 11) Using a ruler and a pen, locate the centerline of the fuselage at both the front and the rear of the wing saddle. Place one mark on the top of the fuselage at the back edge of the wing saddle and one mark on top of the forward bulkhead.

These two marks will help you align the wing when you install it onto the fuselage. You may wish to make these marks in permanent ink so you can align the wing correctly each time you install the wing. This will ensure the wing is aligned properly every time you fly the airplane.

❑ 12) Place the wing onto the **wing saddle**. The joint where the two wing halves were glued together is considered the centerline of the wing. Align the centerline of the wing at both the front and the rear of the wing saddle with the two centerline marks you made on the fuselage.

❑ 13) Using a couple of # 64 rubber bands, temporarily install the wing. To properly install the rubber bands, hook one over one of the front wing hold down dowels, carefully pull it back over the wing and hook it over the rear hold down dowel on the same side. Install two rubber bands on each side for now.

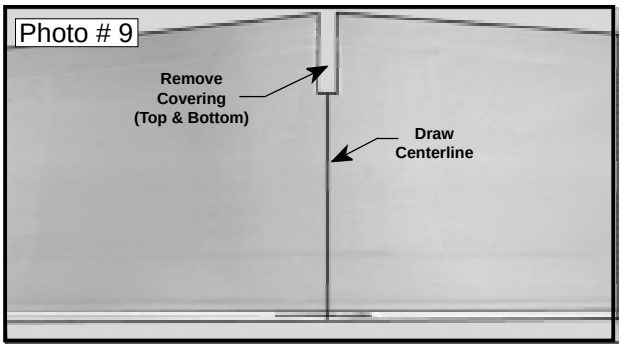
HORIZONTAL STABILIZER INSTALLATION

PARTS REQUIRED

❑ {1} Horizontal Stabilizer w/Elevator & Hinges

ALIGNING THE HORIZONTAL STABILIZER

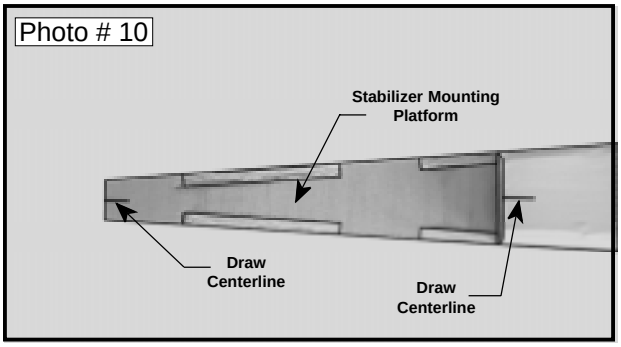
❑ 1) Remove the **elevator** and **hinges** from the **horizontal stabilizer.** Using a ruler and a pen, locate the centerline of the horizontal stabilizer, at the trailing edge, and place a mark. Use a triangle and extend this mark, from back to front, across the top of the stabilizer. Also extend this mark down the back of the trailing edge of the stabilizer. **See photo # 9 below.**



❑ 2) Using a modeling knife, carefully remove the covering from the precut slot in the leading edge of the stabilizer. The slot is located on the centerline and is 1-3/16" long and 1/4" wide. Remove the covering from both the top and bottom of the slot.

❑ 3) Using a ruler and a pen, locate and mark the centerline of the fuselage at both the front and the rear of the stabilizer mounting platform. **See photo # 10 below.**

Photo # 10



❑ 4) Place the stabilizer onto the stabilizer mounting platform. The trailing edge of the stabilizer should be even with the rear edge of the fuselage.

❑ 5) Install the wing onto the fuselage. Align the centerline drawn on the top and the rear of the stabilizer with the centerline marks drawn on the fuselage. When those are aligned, hold the stabilizer in that position using masking tape. Align the horizontal stabilizer with the wing. When viewed from the rear, the horizontal stabilizer should be level with the wing. If it is not level, use 220 grit sandpaper with a sanding block and sand down the high side of the stabilizer mounting platform until the proper alignment is achieved. The tips of the stabilizer should also be equal distance from the tips of the wing. **See figures # 4 and # 5 below.**

Figure # 4

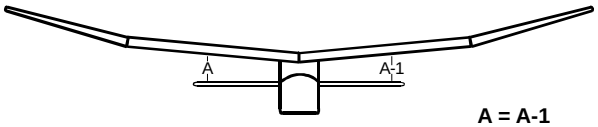
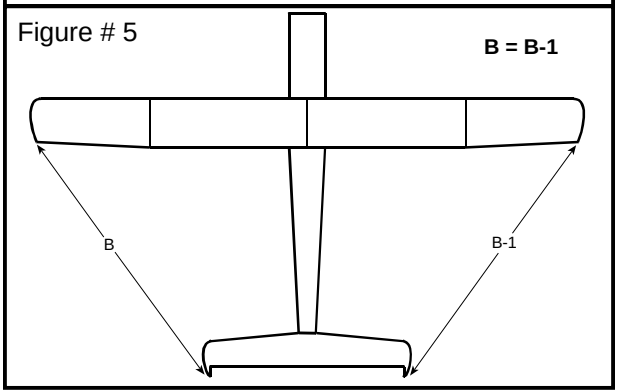


Figure # 5



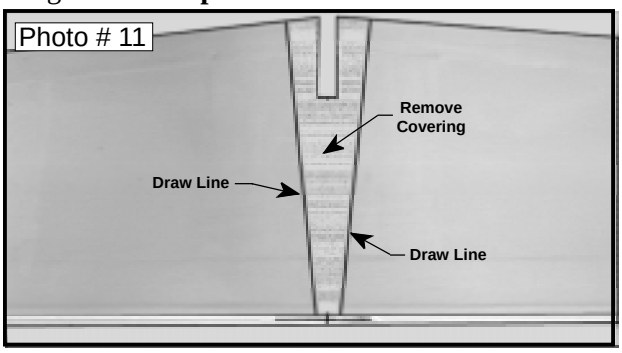
❑ 6) When you are satisfied with the alignment, hold the stabilizer securely in place with masking tape, but *do not* glue it in place at this time.

MOUNTING THE HORIZONTAL STABILIZER

❑ 7) With the stabilizer held firmly in place, use a pen and draw lines onto the stabilizer where it and the fuselage sides meet. Do this on both the right and left sides on the bottom of the stabilizer.

❑ 8) Remove the stabilizer from the fuselage. Using the lines you just drew as a guide, carefully remove the covering from between them using a modeling knife. **See photo # 11 below.**

Photo # 11



When cutting through the covering to remove it, cut with only enough pressure to only cut through the covering itself. Cutting into the balsa structure may weaken it.

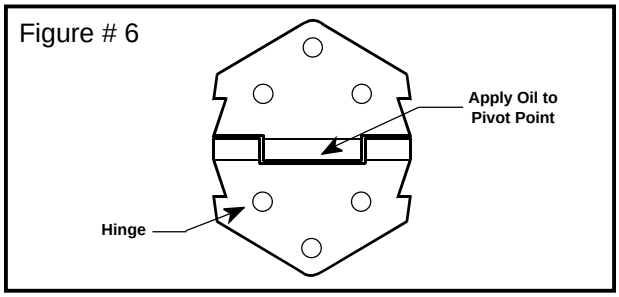
❑ 9) When you are sure that everything is aligned correctly, mix up a generous amount of Kwik Bond 5 Minute Epoxy. Apply a thin layer to the bottom of the mounting area on the bottom of the stabilizer and to the top of the stabilizer mounting platform on the fuselage. Set the stabilizer in place and realign. Double check all of your measurements once more before the epoxy cures. Hold the stabilizer in place with masking tape and remove any excess epoxy using a paper towel and rubbing alcohol.

HINGING THE ELEVATOR

❑ 10) Remove the three plastic hinges from the elevator. Using 220 grit sandpaper, lightly sand the top and bottom of each half of all three hinges.

Lightly sanding the hinge's gluing surfaces will roughen the plastic increasing the bonding strength between the epoxy and the hinge.

❑ 11) Apply a couple of drops of lightweight machine oil to the pivot point of each hinge. **See figure # 6 below.**



Applying oil to the pivot point of the hinges will prevent the epoxy from gluing the hinges solid when they are installed.

❑ 12) Mix a small amount of Kwik Bond 5 Minute Epoxy. Apply a thin layer of epoxy to the top and bottom of only one half of each hinge. Slide the hinges into the hinge slots in the elevator. Remove any excess epoxy using a paper towel and rubbing alcohol.

Insert each hinge into the elevator so the pivot point is about halfway into the leading edge. This will result in the proper hinge gap when the elevator is hinged to the stabilizer.

❑ 13) After the epoxy has set up, mix a second small batch of Kwik Bond 5 Minute Epoxy. Apply a thin layer to the top and bottom of the exposed half of each hinge. Slide the elevator in place, making sure each hinge slides into it's respective hinge slot. Push the elevator firmly against the stabilizer. There should be about a 1/32" hinge gap and there should also be equal space between the tips of the elevator and the stabilizer tips.

❑ 14) Remove any excess epoxy using a paper towel and rubbing alcohol. Once the epoxy has fully cured, any other excess epoxy can be carefully removed from the hinge joint using a modeling knife.

VERTICAL STABILIZER INSTALLATION

PARTS REQUIRED

❑ {1} Vertical Stabilizer w/Rudder & Hinges
❑ {1} Molded Plastic Tail Fairing

HINGING THE RUDDER

❑ 1) Hinge the **rudder** to the **vertical stabilizer** using the same technique used to hinge the elevator.

The top of the rudder should be as close to the tip of the vertical fin as possible without actually rubbing the bottom of the tip.

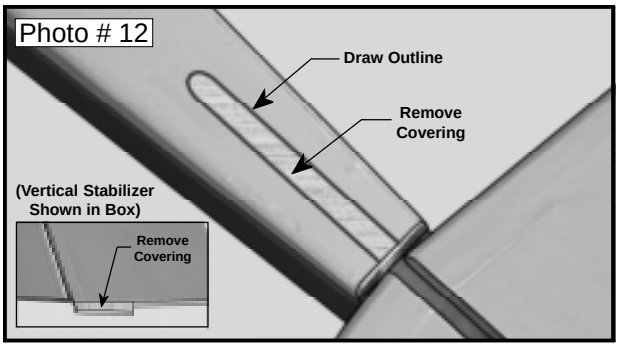
ALIGNING THE VERTICAL STABILIZER

❑ 2) Set the vertical stabilizer on top of the horizontal stabilizer and fuselage. The tab at the rear of the vertical stabilizer fits in the precut slot in the horizontal stabilizer. The bottom edge of the stabilizer should also be firmly pushed against the top of the horizontal stabilizer and the fuselage.

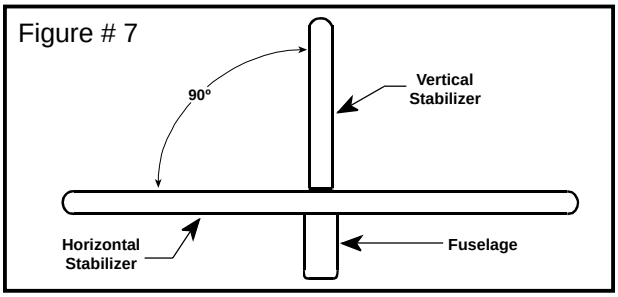
The bottom of the rudder should not touch the top of the horizontal stabilizer. If it does, carefully sand the bottom of the rudder using 220 grit sandpaper with a sanding block until there is sufficient clearance.

❑ 3) While holding the vertical stabilizer firmly in place, use a pen and draw a line on each side of the vertical stabilizer where it meets the top of the horizontal stabilizer. Also draw an outline on top of the fuselage around the vertical stabilizer.

❑ 4) Remove the vertical stabilizer. Using a modeling knife, remove the covering from below the lines you drew. Also remove the covering from inside the outline you drew on top of the fuselage. **See photo # 12 below.**

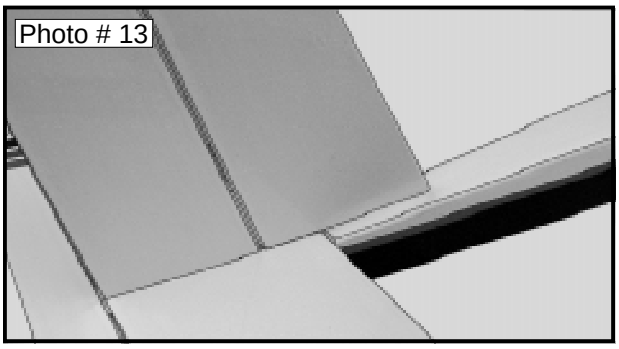


❑ 5) Set the vertical stabilizer back into place. Using a triangle, check to ensure that the vertical stabilizer is aligned 90º to the horizontal stabilizer. **See figure # 7 below.**



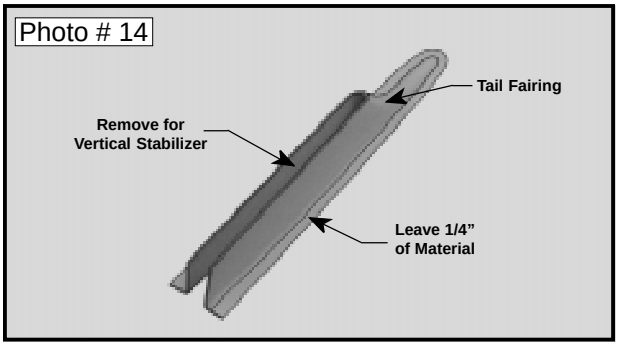
MOUNTING THE VERTICAL STABILIZER

❑ 6) When you are sure that everything is aligned correctly, mix up a generous amount of Kwik Bond 5 Minute Epoxy. Apply a generous layer to the slot in the horizontal stabilizer and to the entire bottom surface of the vertical stabilizer. Set the stabilizer in place and realign. Double check all of your measurements once more before the epoxy cures. Hold the stabilizer in place with masking tape and remove any excess epoxy using a paper towel and rubbing alcohol. Allow the epoxy to fully cure before proceeding. **See photo # 13 below.**



INSTALLING THE TAIL FAIRING

❑ 7) Using a modeling knife, carefully cut out the molded plastic tail fairing leaving 1/4" of material around the entire perimeter to use as a gluing surface. Also remove the material from the top of the fairing so it can slide around the vertical stabilizer. **See photo # 14 below.**



❑ 8) Using a modeling knife, remove the covering from over the precut rudder pushrod exit slot in the top of the fuselage. The slot is located on the right top side of the fuselage (looking from the rear), 3-3/4" in front of the rudder hinge line. The slot is 3/4" long and 1/8" wide.

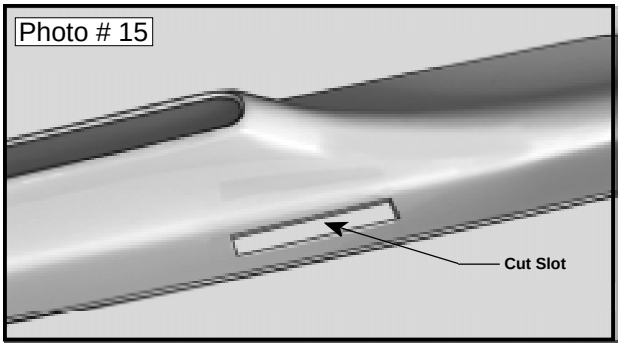
❑ 9) Trial fit the tail fairing in place. It should fit tightly around the fuselage and the front and sides of the vertical stabilizer. Use a modeling knife and 220 grit sandpaper to make any necessary adjustments to obtain the proper fit.

⚠ You may find that the sides of the fairing extend beyond the trailing edge of the vertical stabilizer. Use a modeling knife and cut the sides of the fairing so they are flush with the trailing edge of the vertical stabilizer before installing the fairing.

❑ 10) When satisfied with the fit, remove the fairing and lightly sand the inside surfaces that will be glued to the fuselage, horizontal stabilizer and vertical stabilizer using 220 grit sandpaper.

❑ 11) Using a ruler and a pen, measure and mark the location of the rudder pushrod exit slot onto the plastic fairing.

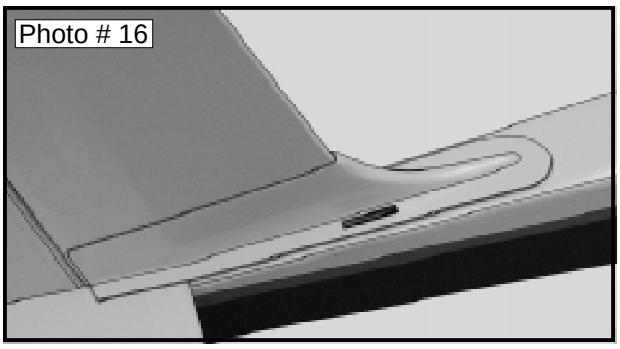
❑ 12) Using a modeling knife, cut the slot in the fairing to match the slot precut in the fuselage. **See photo # 15 below.**



❑ 13) Slide the fairing back into place. Double check the placement of the slot and make any adjustments necessary. While holding the fairing firmly in place, carefully trace around it using a pen.

❑ 14) Using a modeling knife, carefully remove the covering from inside the outline.

❑ 15) Mix a small amount of Kwik Bond 5 Minute Epoxy and apply a thin layer to the gluing surfaces of the fairing. Slide the fairing into place and remove any excess epoxy using a paper towel and rubbing alcohol. Hold the fairing in place using pieces of masking tape until the epoxy fully cures. **See photo # 16 below.**



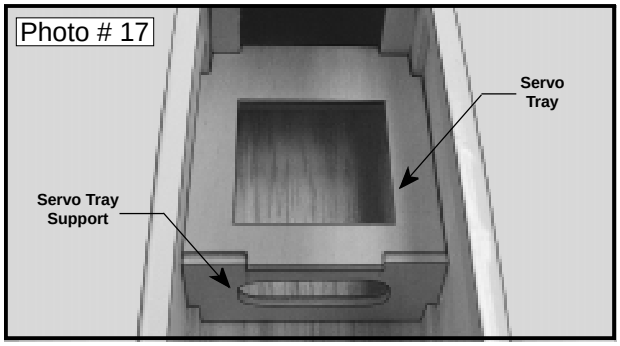
SERVO INSTALLATION

PARTS REQUIRED

- ❑ {1} Servo Tray
- ❑ {1} Servo Tray Support

INSTALLING THE SERVO TRAY

❑ 1) Test fit the **servo tray** and the servo tray support into the fuselage. The support is installed into the two precut notches in the bottom of the fuselage sides. The servo tray fits into the corresponding notches in the support and the rear bulkhead. **See photo # 17 below.**

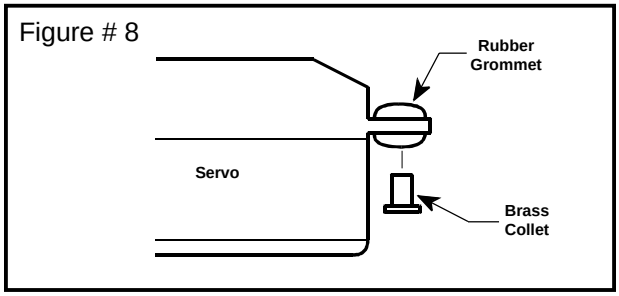


It may be necessary to sand the edges of the servo tray and/or servo tray support to obtain a good fit. If so, use 220 grit sandpaper with a sanding block. Remove small amounts at a time until a good fit is obtained.

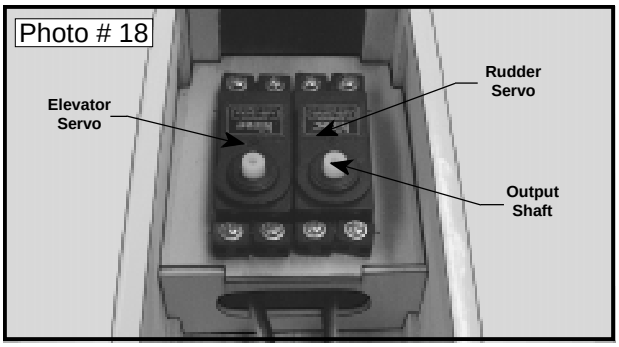
❑ 2) When satisfied with the fit, remove the tray and the support. Mix Kwik Bond 5 Minute Epoxy. Apply a generous amount of epoxy to the gluing surfaces of the support and the tray. Reinstall the parts and allow the epoxy to fully cure.

INSTALLING THE SERVOS

❑ 3) Install the rubber grommets and brass collets provided with your radio system onto two standard servos. **See figure # 8 below.**



❑ 4) Test fit the two servos into the servo tray. The **output shaft** in each of the servos should face the front of the airplane. The servos should be centered within the mount and as close together as possible. **See photo # 18 at top right.**



Because the size of servos differ, you may need to adjust the size of the precut opening in the servo tray to fit your servos. If so, carefully use a modeling knife.

❑ 5) Install the two servos using the wood screws provided with your radio system. Drill 1/16" pilot holes through the servo tray before installing the screws. This will help prevent the wood from splitting and make it easier to install the screws.

PUSHROD INSTALLATION

PARTS REQUIRED

- ❑ {2} 2mm x 610mm Threaded Pushrods
- ❑ {2} 3mm x 640mm Nylon Pushrod Housings
- ❑ {1} 3mm x 55mm x 14mm Pushrod Support
- ❑ {1} 8mm x 20mm Clear Tubing
- ❑ {2} Metal Clevises
- ❑ {2} Nylon Control Horns w/ Backplates
- ❑ {4} 2mm x 15mm Machine Screws
- ❑ {2} Adjustable Servo Connector Assemblies
- ❑ {1} Hex Wrench

INSTALLING THE PUSHROD HOUSINGS

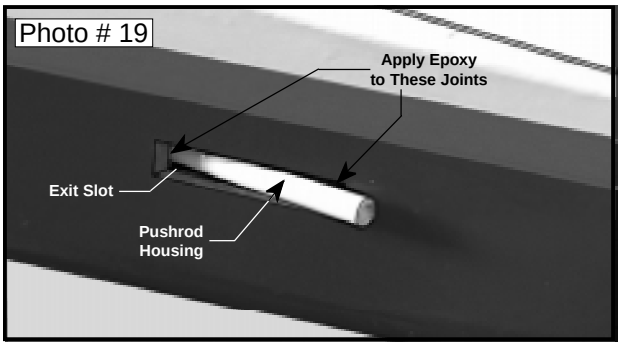
❑ 1) Using a modeling knife, remove the covering from over the precut elevator pushrod exit slot in the fuselage. The slot is located on the left side of the fuselage (looking from the rear), 6-1/2" in front of the elevator hinge line and 3/4" down from the top of the fuselage. The slot is 3/4" long and 1/8" wide.

❑ 2) Test fit the nylon **pushrod housings** into the fuselage. Insert one housing through the rudder pushrod exit slot and one housing through the elevator pushrod exit slot.

❑ 3) Slide the two pushrod housings through the fuselage and into the servo compartment. Using 220 grit sandpaper, lightly sand the last 1" of each of the pushrod housings that extends beyond the outside of the fuselage.

❑ 4) Pull the pushrod housings through the servo compartment until 1/4" of each housing extends beyond the outside of the pushrod exit slots.

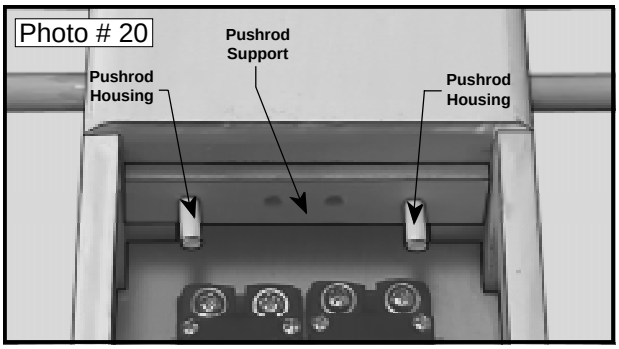
❑ 5) Mix a small amount of Kwik Bond 5 Minute Epoxy. Carefully apply a small amount to the ends of the pushrod housings where they exit the fuselage. Use enough epoxy to fill any gaps and remove any excess using a paper towel and rubbing alcohol. Allow the epoxy to fully cure before proceeding. **See photo # 19 below.**



❑ 6) Slide one pushrod housing through each of the outer holes in the plywood pushrod support. Slide the support over the housings until it is flush with the rear bulkhead.

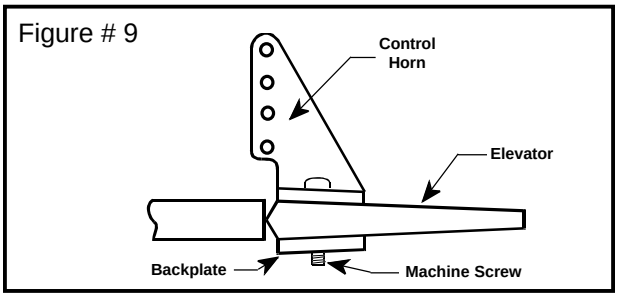
⚠ The pushrod housings should cross inside the fuselage. Make sure the elevator pushrod housing exits the right hole in the pushrod support and that the rudder housing exits the left hole.

❑ 7) With the pushrod support pushed firmly against the rear bulkhead, use a modeling knife and cut off the two housings 1/4" in front of the support. **See photo # 20 below.**



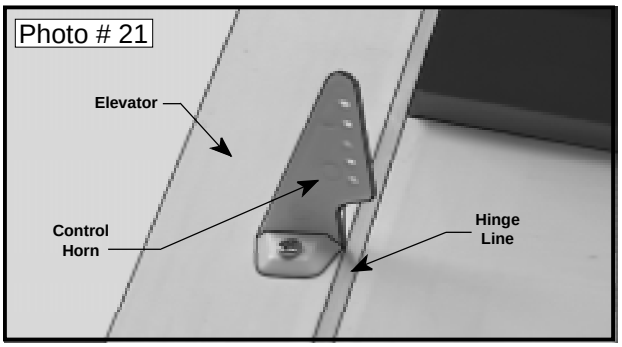
INSTALLING THE ELEVATOR CONTROL HORN

❑ 8) The centerline of the elevator **control horn** is located on the bottom left side of the elevator (looking from the rear) 1-1/8" out from the fuselage side. Position the control horn so the **clevis attachment holes** are directly in-line with the hinge line. The control horn should also be perpendicular to the hinge line. **See figure # 9 below.**



❑ 9) When satisfied with the alignment, use a 5/64" drill bit, and the control horn as a guide, and drill the two mounting holes through the elevator.

❑ 10) Mount the control horn to the elevator by inserting the two 2mm x 15mm machine screws through the control horn mounting base, through the elevator, and into the backplate. Tighten the screws, but do not overtighten them. You do not want to crush the wood. **See photo # 21 below.**



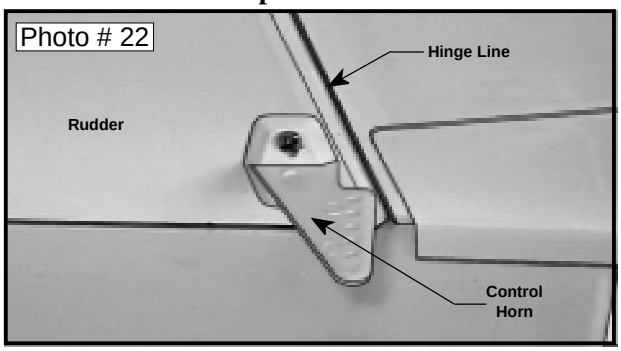
INSTALLING THE RUDDER CONTROL HORN

❑ 11) The centerline of the rudder control horn is located on the right side of the rudder (looking from the rear) 1/2" up from the bottom, at the hinge line. Position the control horn so the clevis attachment holes are directly in-line with the hinge line. The control horn should also be parallel with the top of the fuselage.

⚠ Do not install the rudder control horn perpendicular to the hinge line or the **pushrod** will not line up when it is installed later. The control horn should be parallel to the top surface of the fuselage.

❑ 12) When satisfied with the alignment, use a 5/64" drill bit, and the control horn as a guide, and drill the two mounting holes through the rudder.

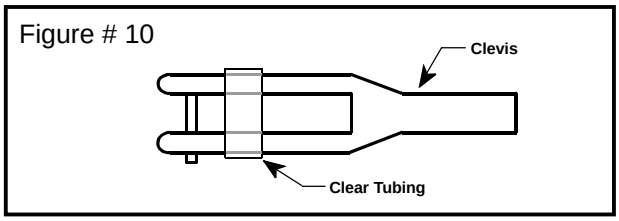
❑ 13) Mount the control horn to the rudder by inserting the two 2mm x 15mm machine screws through the control horn mounting base, through the rudder, and into the backplate. Tighten the screws, but do not overtighten them. You do not want to crush the wood. **See photo # 22 below.**



INSTALLING THE ELEVATOR PUSHROD

❑ 14) Slide one **threaded pushrod** wire into the elevator pushrod housing from the fuselage side. Note that the wire has threads on one end of it. Slide the plain end of the wire into the pushrod housing.

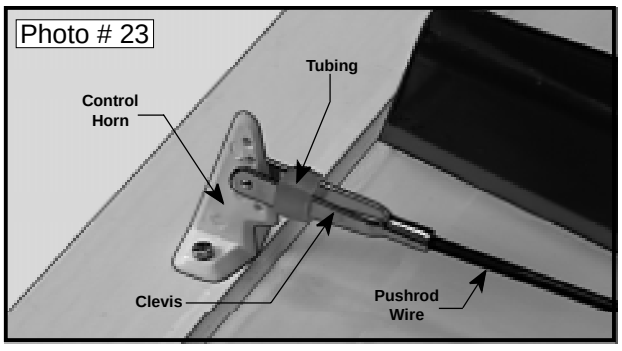
❑ 15) Using a modeling knife, cut the clear vinyl tube into two 1/4" long pieces. Slide one piece of tubing over one metal **clevis**. **See figure # 10 below.**



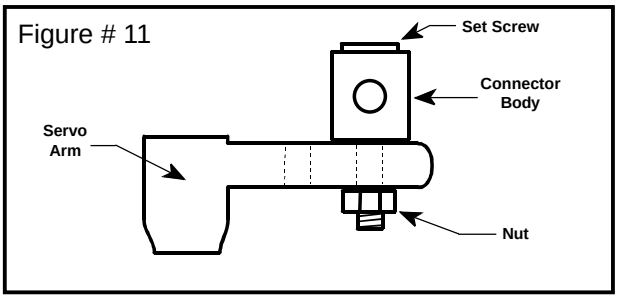
This tubing will prevent the clevis from accidentally opening during flight.

❑ 16) Thread the metal clevis onto the threaded end of the pushrod wire. For security, thread the clevis on no less than 5/16".

❑ 17) Snap the clevis into the third hole out from the base of the control horn. Move the elevator up and down with your hand to test for free movement. **See photo # 23 below.**



❑ 18) Install one **adjustable servo connector** through the second hole out from the center of one **servo arm**. Enlarge the hole in the servo arm using a 5/64" drill bit to accommodate the servo connector. Remove the excess material from the servo arm using a modeling knife. **See figure # 11 below.**



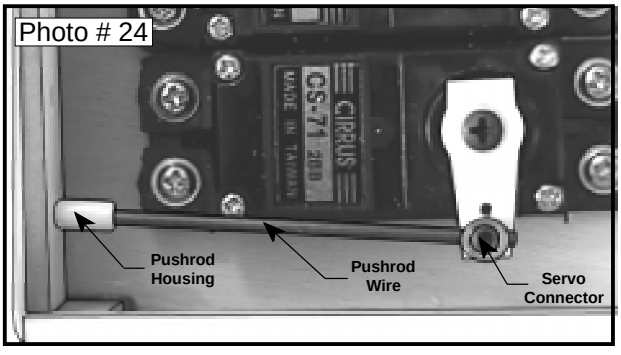
After installing the adjustable servo connector apply a small drop of Kwik Bond Thick **C/A** to the nut. This will prevent the connector from loosening during flight.

❑ 19) Loosen the set screw in the top of the adjustable connector and slide the servo connector/servo arm assembly over the plain end of the elevator pushrod wire.

❑ 20) Use a couple of pieces of masking tape to hold the elevator in neutral.

❑ 21) Plug the elevator servo lead into the receiver. Plug the battery into the motor controller and turn on the radio system. Center the elevator trim tab on the transmitter. Place the servo arm onto the servo. The servo arm should be centered on the servo and point towards the fuselage side.

❑ 22) With both the elevator and the servo arm centered, tighten the set screw in the adjustable servo connector and remove the excess wire using wire cutters. Remove the masking tape from the elevator and install the servo arm retaining screw in the servo arm. **See photo # 24 below.**



INSTALLING THE RUDDER PUSHROD

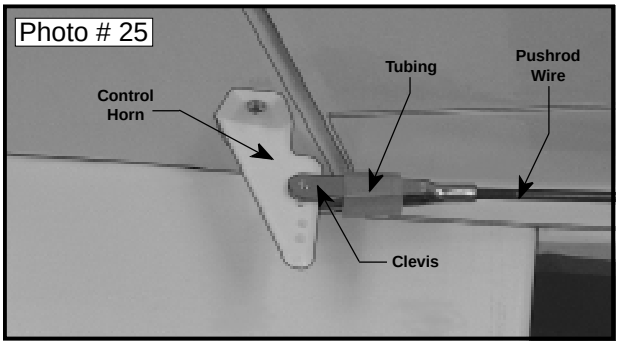
❑ 23) Slide the second threaded pushrod wire into the rudder pushrod housing from the top of the fuselage. Note that the wire has threads on one end of it. Slide the plain end of the wire into the housing.

❑ 24) Slide the second 1/4" piece of clear vinyl tubing over the second metal clevis.

❑ 25) Thread the metal clevis onto the threaded end of the pushrod wire. For security, thread the clevis on no less than 5/16".

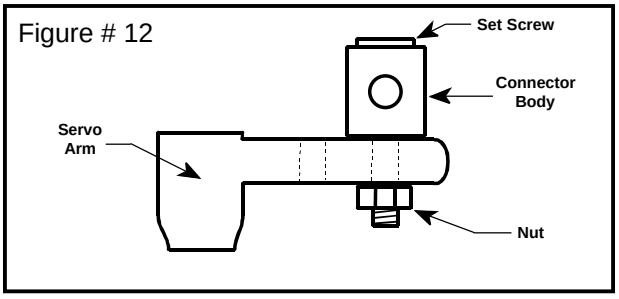
❑ 26) Snap the clevis into the first hole out from the base of the control horn. Move the rudder back and forth with your hand to test for free movement. **See photo # 25 below.**

Photo # 25



❑ 27) Install one adjustable servo connector through the second hole out from the center of one servo arm. Enlarge the hole in the servo arm using a 5/64" drill bit to accommodate the servo connector. Remove the excess material from the arm. **See figure # 12 below.**

Figure # 12



⚠ After installing the adjustable servo connector apply a small drop of Kwik Bond Thick C/A to the nut. This will prevent the connector from loosening during flight.

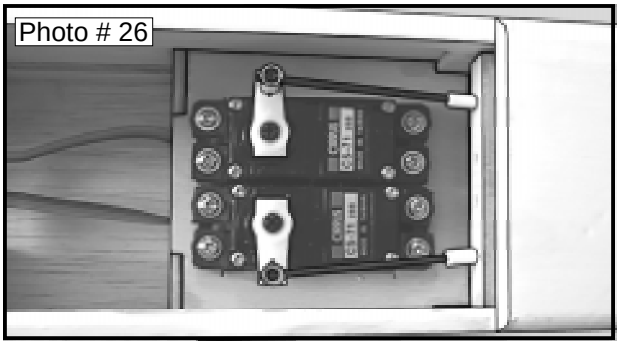
❑ 28) Loosen the set screw in the adjustable connector and slide the servo connector/servo arm assembly over the plain end of the rudder pushrod wire.

❑ 29) Use a couple of pieces of masking tape to hold the rudder in neutral.

❑ 30) Plug the rudder servo lead into the receiver. Plug the battery into the motor controller and turn on the radio system. Center the rudder trim tab on the transmitter. Place the servo arm onto the servo. The servo arm should be centered on the servo and point towards the fuselage side.

❑ 31) With both the rudder and the servo arm centered, tighten the set screw in the adjustable servo connector and remove the excess wire using wire cutters. Remove the masking tape from the rudder and install the servo arm retaining screw in the servo arm. **See photo # 26 below.**

Photo # 26



❑ 32) While allowing the elevator and rudder pushrods to stay in their natural positions, push the plywood pushrod support firmly against the rear bulkhead.

❑ 33) Glue the pushrod support to the rear bulkhead using Kwik Bond Thick C/A. When the glue has cured, glue both of the pushrod housings to the pushrod support. Allow the glue to fully cure.

MOTOR INSTALLATION

PARTS REQUIRED

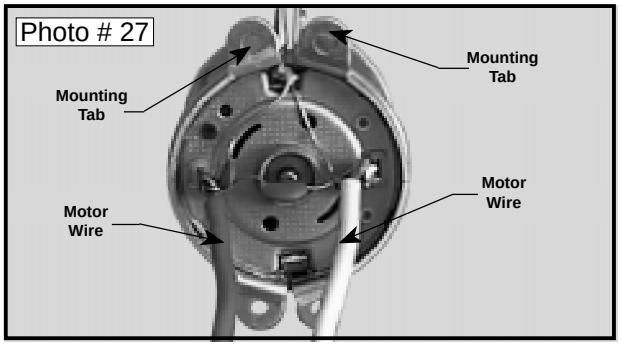
- ❑ {1} Electric Motor
- ❑ {2} Motor Mount Halves
- ❑ {2} 3mm x 8mm Machine Screws
- ❑ {4} 3mm x 12mm Machine Screws
- ❑ {4} 3mm Flat Washers
- ❑ {4} 3mm Nylon Insert Nuts

INSTALLING THE MOTOR

❑ 1) Fit the motor to the two metal motor mount halves. The two halves clamp around the motor and are held in place using two 3mm x 8mm machine screws. Do not tighten the motor mount halves completely at this time.

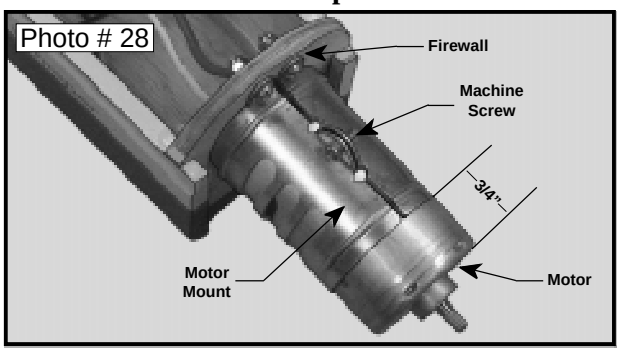
⚠ The four mounting tabs on the motor mount halves should face the back of the motor.

❑ 2) With the motor loosely in the motor mount, twist the motor so the wires on the back of the motor are perpendicular to the mounting tabs on the motor mount. Slide the motor back so the front edge of the motor is 3/4" in front of the motor mount halves. Tighten the two machine screws to hold the motor securely in place. See **photo # 27 below.**



❑ 3) Place the motor assembly up against the front of the firewall. The motor wires and tabs should slide through the precut slot in the firewall and the motor mounting tabs should be vertical.

❑ 4) To properly align the motor, center the motor from left to right on the firewall. For the proper height, center the back of the motor in the middle of the precut slot in the firewall. **See photo # 28 below.**



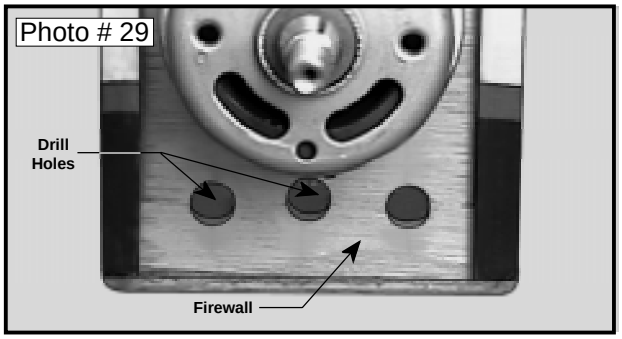
⚠ It is normal for the motor to be angled down. The term for this angle is down-thrust. The Whisper has 5º of down-thrust built into the firewall.

❑ 5) While holding the motor in position, mark the locations of the four mounting holes onto the front of the firewall.

❑ 6) Remove the motor from the firewall. Using a 1/8" drill bit, drill four holes through the firewall at the mounting hole locations.

❑ 7) Mount the motor to the firewall using four 3mm x 18mm machine screws, four 3mm flat washers and four 3mm nylon insert nuts. Slide the machine screws through the mounting tabs and holes in the firewall, then install a flat washer and nylon insert nut onto each screw. Tighten the screws completely to hold the motor mount securely in place.

❑ 8) Using a 1/4" drill bit, carefully drill three holes through the firewall. These holes should be located 3/4" up from the bottom of the fuselage. Two of the holes are located 5/8" in from the fuselage sides and one hole 1-1/8" from the fuselage side. **See photo # 29 below.**



COWL AND PROPELLER INSTALLATION

PARTS REQUIRED

- ❑ {2} Molded Plastic Cowl Halves, Right & Left
- ❑ {1} Nylon Propeller Hub
- ❑ {1} Nylon Spinner Cone
- ❑ {2} Propeller Blade Halves
- ❑ {1} Tapered Aluminum Hex Adapter
- ❑ {1} Threaded Adapter
- ❑ {1} Propeller Washer
- ❑ {1} Propeller Nut
- ❑ {3} 2mm x 12mm Smooth Shank Machine Screws
- ❑ {4} 2mm x 12mm Wood Screws

JOINING THE COWL HALVES

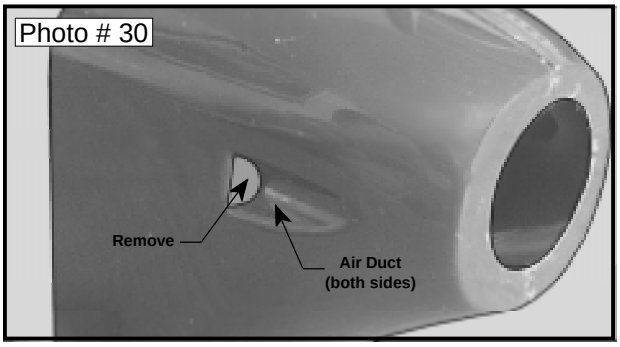
❑ 1) Test fit the cowl halves together. One half has a molded recess that the opposite half glues on to. When aligned properly the front and back edges of the cowl should be even and the seam should be flush.

❑ 2) Hold the cowl halves together using strips of masking tape taped along the outside of the entire seam, both on the top and the bottom of the cowl. It is important that the tape covers the entire seam.

❑ 3) Using Kwik Bond Thick C/A, glue the cowl halves together from the inside. To do this properly, run a thin bead of glue along the entire seam while allowing the glue to seep into the seam and bond the parts together.

❑ 4) Allow the glue to thoroughly cure, then remove the masking tape.

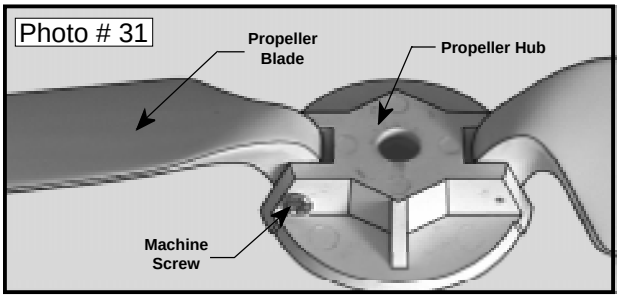
❑ 5) Using a modeling knife, carefully cut out the two molded air ducts in the sides of the cowl. **See photo # 30 below.**



INSTALLING THE PROPELLER

❑ 6) Slide the cowling over the motor, but do not install it at this time.

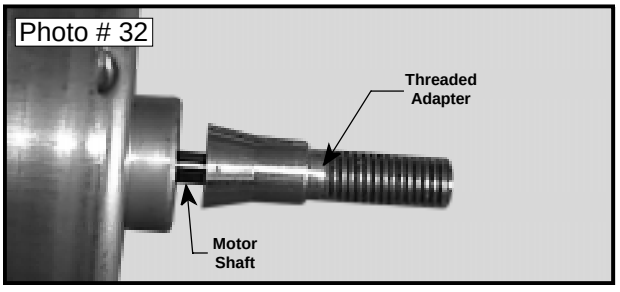
❑ 7) Install the two **folding propeller** blades onto the propeller hub using two 2mm x 12mm smooth shank machine screws. The screws slide through the larger holes in the hub, through the propeller blades and thread into the smaller holes in the hub. **See photo # 31 below.**



Do not overtighten the two screws. Overtightening them can cause the propellers not to fold back properly. Check to make sure they fold easily.

❑ 8) Insert the tapered hex nut into the propeller hub. The tapered side of the nut (larger inner diameter) should face the back of the hub.

❑ 9) Carefully push the threaded adapter onto the motor shaft. Slide the adapter on until the back edge of the adapter is flush with the knurls on the motor shaft. **See photo # 32 below.**



❑ 10) Slide the hub assembly over the threaded adapter. Install the washer and the propeller nut. Tighten the nut snug, but do not overtighten it.

The threaded adapter is machined from lightweight aluminum. Overtightening the propeller nut can damage the adapter.

❑ 11) Slide the spinner cone over the propeller blades and onto the hub. Secure it in place by threading one 2mm x 12mm smooth shank machine screw through the front of the spinner cone and into the threaded adaptor. Tighten the screw securely, but do not overtighten.

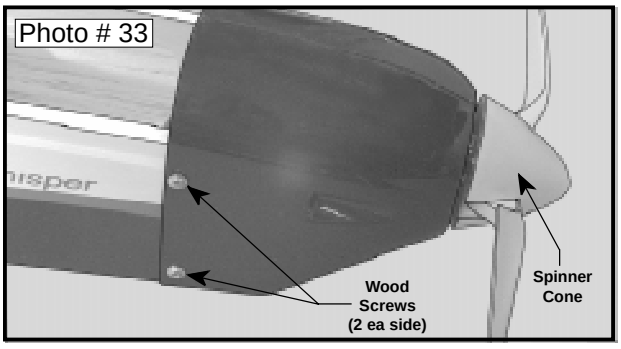
INSTALLING THE COWL

❑ 12) Align the front of the cowling with the back of the spinner. The radius on the cowl should be centered around the radius of the spinner. There should also be a 1/16" gap between the spinner and the cowl. It is important that they do not touch. Use masking tape to hold the cowl firmly in position.

❑ 13) With the cowl held firmly in position, measure forward 1/8" from the back edge of the cowl and place four marks to locate the mounting screws. Two marks are located on each side of the cowl. One mark should be 3/8" up from the bottom of the cowl and one mark should be 1-1/2" up from the bottom of the cowl.

❑ 14) Using a 1/16" drill bit, drill four pilot holes into the cowl and through the fuselage sides at the four marks made.

❑ 15) Mount the cowl to the fuselage using four 2mm x 12mm wood screws. Tighten the screws completely to secure the cowl in place. **See photo # 33 below.**



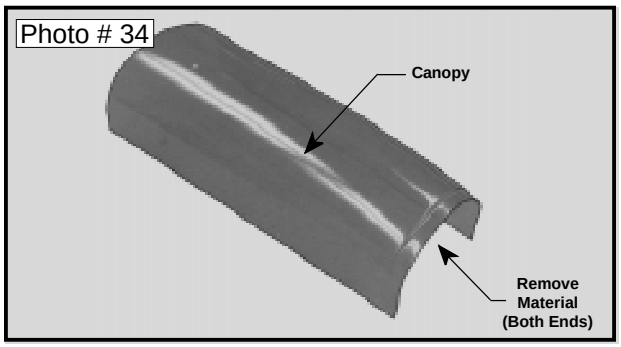
CANOPY INSTALLATION

PARTS REQUIRED

- ❑ {1} Molded Plastic Canopy
- ❑ {4} 2mm x 12mm Wood Screws

ALIGNING THE CANOPY

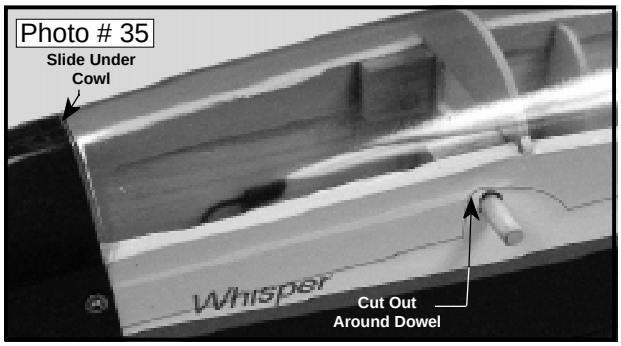
❑ 1) Using a modeling knife, carefully cut out the canopy along it's molded edges. Remove both of the ends of the canopy also. **See photo # 34 below.**



❑ 2) Set the canopy onto the fuselage. The front of the canopy has a molded recess in it. Slide this recess under the back edge of the cowl.

❑ 3) Using a pen, mark the back of the canopy where it comes in contact with the two front wing hold down dowels.

❑ 4) Remove the canopy. Using a modeling knife, remove the portion of the canopy that you marked. Reinstall the canopy as before. The back of the canopy should fit flush against the top of the forward bulkhead. **See photo # 35 below.**

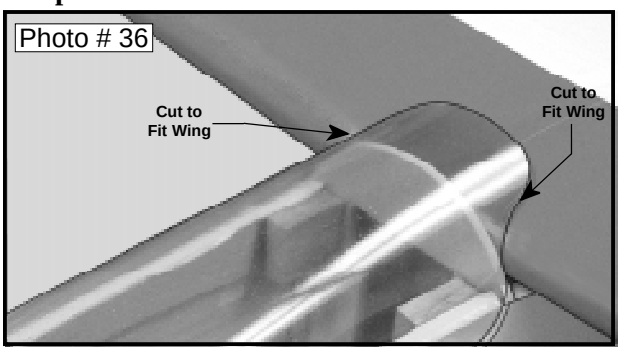


❑ 5) While holding the canopy firmly in place, make marks where the sides of the canopy meet the recessed groove in each side of the fuselage.

❑ 6) Remove the canopy. Use a modeling knife and a straight edge ruler to carefully cut off the canopy at the marks made.

❑ 7) Install the wing onto the fuselage and set the canopy back in place. Using a pen, mark where the canopy needs to be cut to clear the front radius of the wing.

❑ 8) Using a modeling knife, cut the canopy at the mark made. Set the canopy back in place to check your work. Make any other small adjustments necessary until you are satisfied with the fit. **See photo # 36 below.**



❑ 9) When satisfied with the fit, remove the canopy. Using 220 grit sandpaper, carefully sand the edges of the canopy smooth.

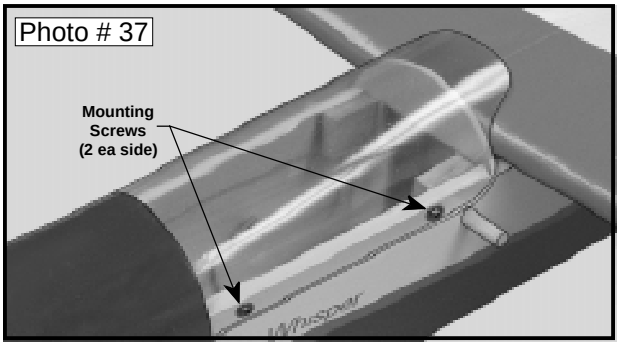
INSTALLING THE CANOPY

❑ 10) Set the canopy back in place and hold it securely to the fuselage using pieces of masking tape.

❑ 11) Using a pen, mark the locations of the four mounting holes. Two holes are located on each side of the canopy. Place two marks 1/8" up from the bottom edge of the canopy. One of the marks should be 1/2" behind the back edge of the cowl and the second mark should be 4" behind the back edge of the cowl.

❑ 12) Using a 1/6" drill bit, drill four holes into the canopy and through the fuselage sides at the four marks made.

❑ 13) Remove the masking tape and secure the canopy in place using four 2mm x 12mm wood screws. **See photo # 37 below**.



LANDING SKID INSTALLATION

PARTS REQUIRED

❑ {1} Molded Landing Skid

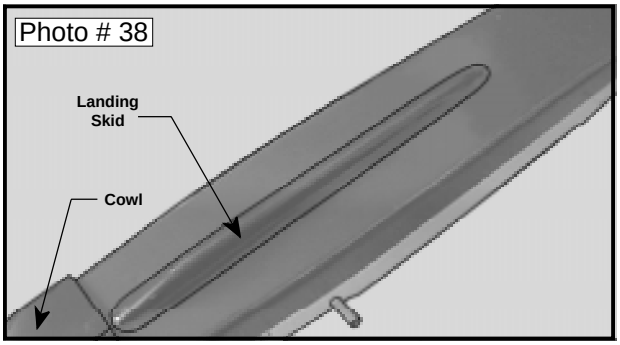
INSTALLING THE LANDING SKID

❑ 1) Using a modeling knife, carefully cut out the plastic **landing skid**. Leave about 1/8" of material around the base of the skid to use as a gluing surface.

❑ 2) Test fit the skid onto the bottom of the fuselage. The skid should be centered from side to side and the front of it should fit just behind the back edge of the cowling.

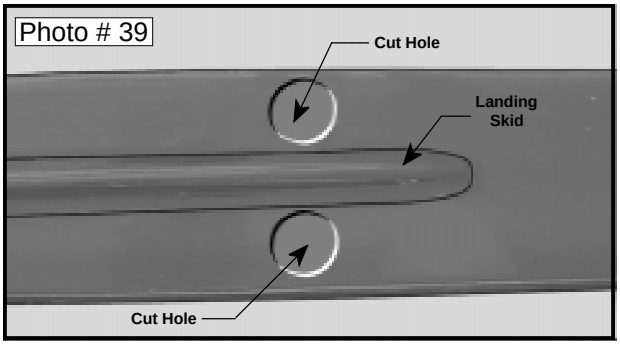
❑ 3) Using 220 grit sandpaper, lightly sand the bottom surface of the skid.

❑ 4) Glue the skid in place using Kwik Bond Thick C/A. Hold the skid in place until the glue fully cures. **See photo # 38 below.**



❑ 5) Using a ruler and a pen, measure back and place two marks on the bottom of the fuselage 7-1/2" behind the back edge of the cowling. Center the two marks between the fuselage sides and the landing skid.

❑ 6) Using a modeling knife, carefully cut two 1/2" diameter holes at the two marks made. **See photo # 39 below.**



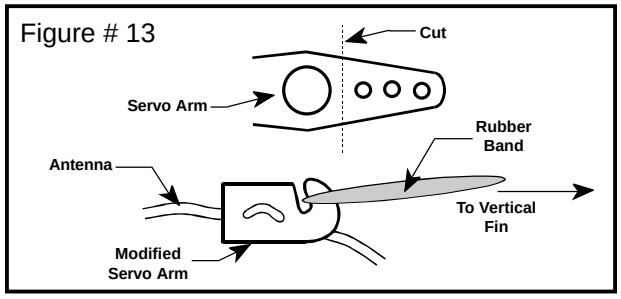
⚠ These two holes are air exit holes that allow hot air to flow out of the fuselage after it has passed over the motor and the battery pack.

FINAL ASSEMBLY

INSTALLING THE RECEIVER

❑ 1) Install the receiver in front of the servo tray. Use a scrap piece of wood laid over the receiver and glued to the fuselage sides to hold the receiver securely in place.

❑ 2) Using a 1/16" drill bit, drill a hole through the side of the fuselage, near the receiver, for the antenna to exit. Route the antenna out of the fuselage and secure it to the vertical stabilizer using a rubber band and a modified servo arm. **See figure # 13 below.**



INSTALLING THE SWITCH

❑ 3) Plug the servo leads and the switch lead into the receiver.

❑ 4) The switch should be mounted on the fuselage side, close enough to the receiver so the lead will reach. Use the faceplate of the switch itself to locate and mark the switch cutout and mounting holes.

❑ 5) Cut out the switch hole using a modeling knife. Use a 5/64" drill bit and drill out the two mounting holes through the fuselage side.

❑ 6) Secure the switch in place using the two machine screws provided with the radio system.

INSTALLING THE BATTERY AND E.S.C.

❑ 7) Connect the plug on the motor controller to the plug on the motor. Connect the motor controller to the receiver. Place it in the fuselage so it will easily reach the flight battery without putting any strain on the other wires.

❑ 8) Install the flight battery in the fuselage. It rests in the two preinstalled bulkheads in the forward section under the wing. The battery can be removed and installed by removing the canopy or the wing.

BALANCING

❑ 1) It is critical that the Whisper be balanced correctly. Improper balance will cause your plane to lose control and crash. ***The center of gravity is located 2-3/8" back from the leading edge of the wing, at the fuselage sides.*** This location is recommended for initial test flying and trimming. There is a 3/8" margin forward and aft, but it is not recommended that the **center of gravity** be located any further back than 2-3/4".

❑ 2) Mount the wing securely to the fuselage using six # 64 rubber bands per side. Using a couple of pieces of masking tape, place them on the bottom side of the wing 2-3/8" back from the leading edge, at the fuselage sides.

❑ 3) Place your fingers on the masking tape and carefully lift the plane.

❑ 4) If the nose of the plane falls, the plane is nose heavy. To correct this slide the flight battery further back in the fuselage. If the tail of the plane falls, the plane is tail heavy. To correct this, slide the flight battery forward in the fuselage.

Once you have flown and become familiar with the flight characteristics of the Whisper, the balance point can be moved forward or aft to change the flight characteristics. Moving the balance point back will cause the Whisper to be more responsive, but less stable and increase the **stall speed**. Moving the balance point forward will cause the Whisper to be more stable, but the control sensitivity will be sluggish. Once you find the optimum center of gravity, we suggest placing a mark on the battery pack, next to one of the bulkheads. This way you will be able to install the battery pack in the proper location every time.

CONTROL THROWS

❑ 1) We highly recommend setting up the Whisper using the control throws listed. We have listed control throws for both initial test flying/training and for the accomplished pilot. If this is your first airplane, please set the control throws according to the training settings. These settings allow the airplane to fly smoother and make it easier to control.

❑ 2) Turn on the radio system. With the trim tabs on the transmitter in neutral, center the control surfaces by making adjustments to the clevises or adjustable servo connectors. The servo arms should be centered also.

❑ 3) When the elevator and rudder control surfaces are centered, move the control stick to the full deflection for each control surface. Use a ruler and check the amount of the control throw. ***The control throws should be measured at the widest point of each surface!***

INITIAL FLYING/TRAINING

Elevator:	3/8" up	3/8" down
Rudder:	5/8" right	5/8" left

ACCOMPLISHED PILOT

Elevator:	5/8" up	5/8" down
Rudder:	7/8" right	7/8" left

Do not use the accomplished pilot settings for initial test flying or training.

By moving the position of the clevis at the control horn toward the outermost hole, you will decrease the amount of throw of that control surface. Moving the clevis toward the control surface will increase the amount of throw.

FLIGHT PREPARATION

❑ 1) Check the operation and direction of the elevator, rudder and throttle.

❑ A) Turn your radio system on.

****CAUTION**** Do not turn the receiver on unless the transmitter is turned on first. Always turn the transmitter on first. NEVER allow hands or clothing to get in the way of the propeller when the radio is turned on. Sudden unwanted radio signals or turning the radio on with the throttle lever set at full throttle can turn on the motor unintentionally. Always make sure the throttle lever is set to off before turning on the transmitter.

❑ B) Check the elevator first. Pull back on the elevator stick. The elevator should move up. If it does not, flip the **servo reversing switch** on your transmitter to change the direction.

❑ C) Check the rudder. Looking from behind the airplane, move the rudder stick to the right. The rudder should move to the right. If it does not, flip the servo reversing switch on your transmitter to change the direction.

❑ D) Check the throttle. Moving the throttle stick forward should turn on the motor.

❑ 2) Check Control Surface Throw.

❑ A) The Rudder should move 5/8" left and 5/8" right from center. If it moves too far, move the pushrod clevis to a hole in the rudder control horn away from the rudder. Do the opposite if there is not enough throw.

❑ B) The elevator should move 3/8" up and 3/8" down from center. If it moves too far, move the pushrod clevis to a hole in the elevator control horn away from the elevator. Do the opposite if there is not enough throw.

PREFLIGHT CHECK

❑ 1) If you did not yet break in the motor, refer to page # 6 and follow the instructions for motor break-in. Correct break-in will result in higher performance and longer motor life. *It is highly recommended.*

❑ 2) Cycle the motor battery three times. Nicad batteries, when new, need to be used 2-3 times before they produce their top voltage and duration. Simply charge the battery and then run the motor until the motor stops. Allow the battery and motor to cool, then repeat this procedure two more times.

❑ 3) Check every nut and bolt and every glue joint in the Whisper to ensure everything is tight and well bonded. This should include all of the control surface hinges as well.

❑ 4) Double check the balance of the airplane.

❑ 5) Check the control surfaces. All should move in the correct direction and not bind in any way.

❑ 6) Check the receiver antenna. It should be fully extended and not coiled up inside the fuselage.

❑ 7) Check the condition of the transmitter batteries. They should be fully charged if they are rechargeable type Nicads, or replaced if they are non-rechargeable cells and the voltage indicator drops out of the green.

ABC's OF FLYING

If you've come this far, now you're ready to prepare for the maiden voyage of your new Whisper. Before proceeding, we highly recommend double checking all of your work. Make sure there is no detail you missed and that you understand all of the airplane's functions. Taking time right now to do this will make your first few flights much more enjoyable. We hope you find the following sections helpful, making your first few flights successful.

Since you've chosen the Whisper, you've avoided making the most common mistake beginners make: choosing a high performance aircraft like a P-51D Mustang or an F-16 Jet as a trainer. Just as you wouldn't learn to drive a car using an Indy car, learning to fly R/C aircraft should start in a trainer. The second mistake new pilots make is not seeking out the help of an experienced modeler. While it is certainly true that some people have learned to fly without help, having the help of an experienced R/C model pilot will help make those first few flights more successful. So, we highly recommend seeking out a club or a flying field near you. You'd be surprised just how many clubs that help beginners all over the world!

Once at the field, even before removing your plane from the car, introduce yourself to some of the other pilots. Find out what safety procedures and frequency control system is in place. In short, learn and follow the field etiquette. Doing so will ensure safe modeling for you and others as well as give you a chance to meet the other flyers and find out who might be the right person to help you learn to fly.

Sometimes, it is just impossible to find anyone to help. In that case it would be wise to seek out some additional information about flying R/C. R/C Modeler Magazine, Harry Higley Models and Model Airplane News Magazine all publish very good basic flight training books that will explain flying in more detail. You may also wish to seek out a computer simulator. Great Planes and Dave Brown both make excellent flight simulators that can be very effective at teaching the basic coordination of R/C flight.

If you decide you have no choice but to learn to fly on your own, choosing the right place to fly your Whisper is of the utmost importance. Select your potential flying field with the following considerations:

1) Look for a site that has a soft landing area. The best sites are large grassy fields.

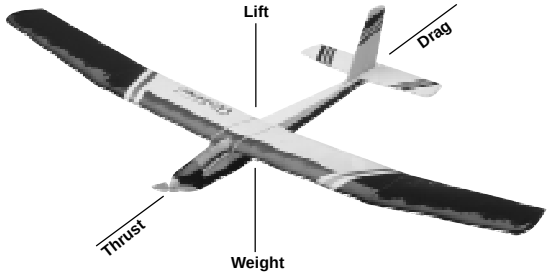
2) The fewer the ground obstructions the better. No trees, buildings or large rocks should be nearby.

3) No people or houses should be nearby. While R/C flying is generally safe, it can lead to harm or injury. Do not try to fly your model if there are houses or people nearby.

4) There should be no high-lines, telephone lines or electrical lines anywhere near where you are flying. If your plane accidentally does fly into wires of any kind, do not try to retrieve it yourself. Serious injury or even death could result. Contact the local electric service company or police or fire department to help you in retrieving your airplane.

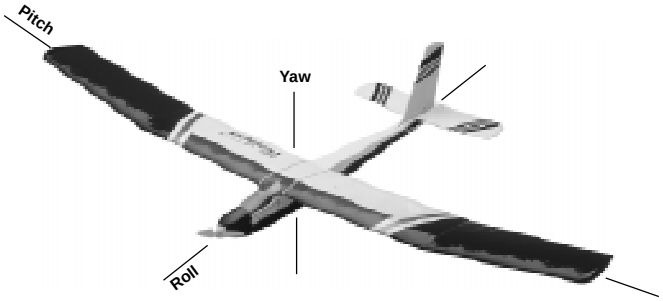
BASICS OF FLIGHT

To begin you should know how your Whisper operates. First, there are four forces operating on a flying aircraft: Lift, Weight, Thrust and Drag. The motor will create thrust to overcome the drag. In times when the engine is off, gravity pulling the plane down can act as thrust. This is how the Whisper flies when the motor is shut down. The wing flies through the air as a result of the thrust and causes lift to overcome the weight of the aircraft.



Controlling the Whisper

Flying is three dimensional, therefore, all aircraft operate on three axis: roll, yaw and pitch. Roll is the wing tips raising and lowering. Yaw is the nose moving from right to left. Pitch is seen as the nose moving up and down. Maintaining flight is the act of overcoming weight and drag with lift and thrust while properly controlling all three axis.



Choosing the Whisper greatly simplifies these activities. First, it takes very little thrust to overcome the drag. So much so that the Whisper will glide and thermal without any motor power at all.

Second, the wing is a high lift design that easily overcomes the weight which means that the Whisper can fly very slowly.

Flying the Whisper

Check the controls. Make sure the throttle, elevator and rudder are all working properly. The flight battery should be fully peak charged and ready to go. First, let's lay out the basic maneuvers that will make up your training flights.

1) Launching
2) Climb-out
3) Level Flight
4) Standard Turns
5) Descent
6) Landing

All flight is based on these few tasks. Here, we've laid them out in the same order they will be during flight. Learn these basics and you will soon fly your Whisper with great success. Now look at each maneuver individually. Before flight, make sure you are completely familiar with the functions of the transmitter including all controls and trim tabs.

Launching and climb-out requires that the plane be facing directly into the wind. To launch the airplane, lightly grasp the fuselage in your hand, between your thumb and forefingers, just below the wing, at the center of gravity. Hold the plane at about shoulder level, apply full power and solidly toss the airplane straight ahead and level. Do not throw it hard or up at an angle.

Fly the airplane level for about 30 feet and allow the speed to pick up. Use the rudder to keep the Whisper tracking straight. After the Whisper has picked up some speed, begin a shallow climb-out by applying a small amount of up elevator. Be gentle. You don't want to overcontrol the airplane. Allow the plane to climb on its own. Climbing too fast will cause the plane to pitch up and it will stop flying (this is called a stall). If this happens, allow the nose to drop slightly (which will give the airplane more speed) and then apply a small amount of up elevator to bring the nose level.

Once the airplane has reached 50 to 100 feet of altitude, it is time to level the plane and then try a turn. To level the plane, simply move the elevator stick to neutral. Keep the wings level using the rudder. If the plane still climbs slightly or turns, adjust the elevator trim tab until the airplane flies straight with no stick input.

Now try a turn (before the airplane gets too far away). To turn, apply rudder in the direction you want to turn until the wing drops about 15 degrees (or the wing tip is just below the fuselage). As the wing drops, begin to apply up elevator. Up elevator will maintain the plane's altitude and will hold it in the turn. To prevent the plane from turning too steep, as soon as a good bank is established, release the rudder control. Use only the elevator to maintain altitude and hold the plane in the turn. Once it has turned enough, apply opposite rudder to level the wings. As this opposite rudder is applied, slowly release the up elevator.

Now continue level flight, which will be a small series of tiny corrections of elevator and rudder to keep the plane straight and level. If you lost altitude during the turn, this is a good time to climb out again.

Before the plane gets too far away, try another turn. Continue making standard turns and keep the airplane over the flying field.

The next maneuver will be descent. Usually, one pairs descent with landing, but in fact, most model airplanes are constantly descending and climbing. Having the ability to perform a good controlled descent is important. To descend, simply throttle back to turn off the motor. As the motor is turned off, allow the plane's nose to drop some.

The descent should be gentle, so let the nose drop about 10 to 20 degrees. Keep the wing level unless a turn is required. If you must turn, bank as usual to start the turn but only hold about half of the normal amount of up elevator you usually hold to maintain a turn. In doing so, you will not slow the airplane too much. When you've reached your desired altitude, level the wings and add throttle as you add some up elevator to level the plane.

The final maneuver will be landing. For your first landing, the goal should be to get the plane down anywhere on the field without hitting anything. Landings should always be made into the wind. Usually, it is easiest to set up for a landing by making a landing approach. The first part of the landing approach is the descent. Descend going with the wind (opposite of the direction you will be landing). Once you've descended to an altitude of 30-50 feet, turn into the wind. At this point level the wings, throttle back until the motor turns off and the propeller folds back and allow the nose to drop to descend to the ground without getting too slow. When the plane is about 10 feet off the ground (just above eye level), apply small amounts of up elevator to slow the descent and to slow the plane. Remember to keep the wings level. Now the plane should descend but will seem like the nose has not dropped much. If the plane doesn't descend, allow the nose to drop a little. Just before the plane touches down, apply some up elevator to level the plane with the ground.

Things to avoid

1) *Stalling.* Stalling is when the air stops flowing over the wing properly. For the Whisper, this only happens when the airplane is flying very, very slow. A stall normally results in the nose dropping rapidly. If a stall does occur, allow the nose to drop, which will increase the airspeed, then apply up elevator to level the plane. Remember to not pull too much up elevator or the stall may occur again.

2) *Radical Turns*. Keeping the wings level or making standard turns are big steps in preventing the plane from getting out of control. If the plane seems too fast or is getting into too steep a turn, try letting all the controls go to neutral, then reduce the throttle and make corrections to level the wings and then level the plane.

3) *Overcontrolling*. Most new pilots try to fly like they are playing a video game. Most likely, you will never need full stick movement for any correction. Typically, you will need very little down elevator as well. Remember to move the stick in only small amounts at a time. The radio control system you are using is proportional, meaning the amount you move the stick is in direct proportion to the amount the control surface moves. Full deflection of the control surfaces is typically reserved for correcting a major mistake or trying an aerobatic maneuver.

Planning the first flight

After reading through the maneuvers, you need to plan your first flight. For your first flight, pick a day that is clear and not windy. Too much wind will complicate your first flight. Take the time to envision the flight path. The flight will, of course, begin with launching and climb-out. Once a safe altitude has been reached, make a turn down wind and continue to climb. Level off at about 100 feet of altitude. Try to perform a basic figure 8 pattern. Learn to make small corrections to keep your plane pointed in the direction you want it to fly. After 3 or 4 minutes, begin your descent to land. Turn into the wind to land. If you're first landing gets the plane down in one piece and it is located somewhere on the flying field, that is pretty good!

We hope this information will help you make those first few flights successful.

BASICS OF THERMAL FLYING

The following is intended toward those pilots who have mastered basic flying with the Whisper. **Thermal flying** is by far the most difficult aspect of glider flying, however it can be the most rewarding. The beautiful thing about the Whisper is because it is electric you have a much better chance of being able to seek out and locate thermals. For more information on thermals, check out your local library or the Internet. There are many books and articles available that detail what thermals are and how they work.

Thermal flying is truly an art and there is a good amount of luck when you do find the perfect thermal, but there are ways to hone your skills so that you can become an artist in flying thermals rather than remaining a hopeful novice who blunders into them by accident. The following are some keys to start this process that should help you learn to be a better thermal pilot.

The first key is to become very familiar with the way the Whisper flies. The way it responds when entering and exiting lift is essential. These are things you will notice as you fly the Whisper more and more. You need to be familiar with the plane so that you recognize when it is flying normally and when it is responding to up or down air. A new plane is very hard for the novice to tell what is happening in regards to the air. He or she is uncertain if the movement is due to something the pilot did or due to air movement. You want the plane to be properly trimmed out so that it flies stable and smooth and to know how it responds when you turn. **Polyhedral** wing designs, like the Whisper, try to remain stable and are easier for the novice to fly than straight wing planes (i.e. wings with no dihedral) and, more importantly, are responsive to hitting the side of a thermal more dramatically than straight wing planes do.

You will seldom hit a thermal straight on in flight. More often you will hit the side of the thermal and it will lift one wing more and literally throw your plane away from the lift. When your plane should otherwise be flying level, watch for a sudden lift of a wing tip and turn the plane into that area. There is a good chance that you hit the side of a thermal and it pushed you away—into the air next to the thermal. If you power up to fly into the thermal, be careful. You might fly right through it. Having located a thermal, turn into it and start circling to locate the area of strongest lift. Tighten up the circle to get the maximum rate of climb.

Think of the air as water. No wind is a calm lake. A breeze is a slow moving stream and a heavy wind is a raging river. Often, a pilot hits some lift, starts circling and goes up and up and stays right in the same spot circling. Then he starts coming down and doesn't understand why. On a calm day, once you hit lift you can circle right there as it isn't going anywhere but up. It may die after a short time, but that happens. With wind, picture your lift as an escalator going downwind at the same rate as the wind is blowing. You hit it and start to circle and you go up but you have to have your circling go downwind at the same speed as the wind to stay on the escalator. The lift is moving and if you don't go with it you lose it.

Watch the tail of the airplane bounce up to see if you are hitting lift. When you fly into a thermal it kicks the tail up and thus points the nose down. Despite this “dive” position your plane may actually be going up in the lift. It depends on the strength of the thermal. That “up tail” is a sign to watch for in thermal spotting.

Use your visual keys and work on your skills so you can become accustomed to thermal flying. Don't forget to watch the birds too. If you see birds with their wings stretched out, circling high above, you can be sure they are in a thermal. Launch your plane and head in that direction. They won't mind you joining them in the fun!

GLOSSARY OF TERMS

Adjustable Connector: Connects to the servo arm. The pushrod wire passes through the connector and is held in place with a set screw. The screw can be loosened to allow the pushrod wire to be adjusted to the correct length.

C/A Glue: An acronym for Cyanoacrylate. It dries very fast like "Super Glue". It comes in many different formulas for different uses.

Center of Gravity: Most commonly referred to as the CG or balance point, it is the point at which the airplane is in complete balance in all three axis.

Clevis: Part of the control system, either made out of nylon or metal. It connects the pushrod wire to the control horn mounted on the control surface.

Clevis Attachment Holes: The molded holes in the control horn. The clevis attaches to these holes.

Control Horn: Part of the control system, the control horn is mounted to the control surface. It allows the pushrod to be connected to the control surface. Most all control horns are adjustable to allow for more or less control surface movement.

Covering: Material made out of vinyl or polyester. Covering has heat sensitive adhesive that when heated, sticks to the wood frame of the airplane. The Whisper uses heat sensitive vinyl covering.

Cycle: The act of fully charging and discharging the flight battery. Cycling the battery increases performance and duration.

Dihedral: The upward angle of each wing half. Dihedral creates more stability that makes learning to fly much easier.

Dihedral Brace: Made out of plywood, the dihedral brace strengthens the joint between two wing sections.

Elevator: The elevator is the control surface on the back of the airplane that moves up and down. This surface controls pitch.

E.S.C.: Electronic Speed Control. See Motor Controller below.

Epoxy: A two part glue containing a resin and a hardener. Epoxy is available in several drying times and is stronger than C/A glue. Epoxy is used in high stress areas such as joining wing halves.

Folding Propeller: The propeller is mounted to the motor. It turns the with the motor to give the airplane forward thrust. The propeller on the Whisper folds back when the motor is off. This allows less drag and prevents the propeller from breaking during landing.

Hinges: Usually made out of plastic, the hinges connect the control surfaces to the stabilizers or wing. They pivot allowing the control surface to move.

Horizontal Stabilizer: Mounted in the rear of the airplane, the stabilizer works with the elevator to control pitch.

Landing Skid: Usually made out of tough plastic, the landing skid mounts on the bottom of the fuselage to prevent damage to the fuselage during landing.

Motor Controller: Usually called an electronic speed control (ESC), the motor controller controls the speed of the motor. Motor controllers can also be simple on and off switches.

Output Shaft: The final portion of the output gear. It's the part the protrudes from the top of the servo.

Peak Charger: A type of battery charger that uses a microprocessor to sense when your battery is fully charged (peak charged). Once peak charged, the charger shuts off so the battery does not overcharge.

Polyhedral Wing: A wing that has dihedral in three different points on the wing. The Whisper utilizes a polyhedral wing.

Pushrods: Connect between the control surface and the servo. Transfers the movement of the servo to the control surface.

Pushrod Housing: A tube that is usually nylon. The pushrod wire runs through the housing.

Receiver: The part of the radio system that receives the signals from the transmitter.

Rudder: The rudder is the control surface on the back of the airplane that moves right and left. This works with the polyhedral wing to turn the airplane.

Servo: The part of the radio system that produces the movement necessary to move the control surfaces. The servo includes a small motor, gears and a circuit board to function.

Servo Arm: Connects to the servo, the servo arm allows the pushrod to connect to the servo.

Servo Reversing: An option on most all new radios, servo reversing allows you to change the direction a servo rotates by just flipping a switch on the transmitter.

Servo Tray: Usually made out of plywood, the servo tray is the mounting base for the servos.

Stall Speed: The speed at which air stops moving fast enough over the surface of a wing to keep the airplane flying.

Thermal: Simply put, a column of warm or hot air that rises. Birds and glider pilots enjoy flying in thermals. Airplanes like the Whisper are specifically designed to fly in thermals.

Threaded Pushrod: A length of wire that has threads cut into one end of it. See Pushrods.

Transmitter: The part of the radio system that you control. It transmits the control inputs to the receiver, which transfers that information to the servos.

Trim Tab: A sliding tab on the transmitter that allows you make small adjustments to the control surfaces from the transmitter.

Vertical Stabilizer: Mounted on the rear of the airplane, it works with the rudder to turn the airplane. It also gives the airplane vertical stability.

Wing Hold Down Dowels: Round pieces of hardwood dowels inserted through the fuselage at the front and back of the wing. They are anchors for the rubber bands that hold the wing onto the fuselage.

Wing Saddle: The portion of the fuselage where the wing mounts on to.

NOTES

PRODUCT EVALUATION SHEET

Telling us what you like and don't like determines what model kits we make and how we make them. We would appreciate it if you would take a few minutes of your time to answer the following questions about this kit. Simply fold this form on the dotted lines, seal with tape and mail it to us. *Do not use staples and make sure our address faces out.*

1) Kit: **Wattage Whisper Electric Glider**

2) Where did you learn about this kit?
- ❑ Magazine Ads
- ❑ Friend
- ❑ Hobby Shop
- ❑ Other
- ❑ Internet

3) What influenced you the most to buy this kit?
- ❑ Magazine Ads
- ❑ Price
- ❑ Type of Model
- ❑ Box Art
- ❑ Recommendation
- ❑ Other
- ❑ Internet

4) Did you have any trouble understanding the written instructions? If yes, please explain.
- ❑ Yes
- ❑ No

_____
_____
_____
_____

5) Did you have any trouble understanding any of the photographs. If yes, please explain.
- ❑ Yes
- ❑ No

_____
_____
_____
_____

6) Were any of the kit parts:
- ❑ Damaged
- ❑ Wrong Size
- ❑ Missing
- ❑ Wrong Shape

If you checked any of the boxes above, did you contact our Customer Service Department to re solve the problem?
- ❑ Yes
- ❑ No

7) Was any of the assembly difficult for you? If yes, please explain.
- ❑ Yes
- ❑ No

_____
_____
_____
_____

8) What did you like most about this kit?
- ❑ Assembly Manual
- ❑ Parts Fit
- ❑ Hardware Supplied
- ❑ Price
- ❑ Other

_____
_____
_____

9) What did you like least about this kit?
- ❑ Assembly Manual
- ❑ Parts Fit
- ❑ Hardware Supplied
- ❑ Price
- ❑ Other

_____
_____
_____

10) Are you satisfied with the finished model? If no, please explain.
- ❑ Yes
- ❑ No

_____
_____
_____
_____

11) How does this kit compare to similar kits by other manufacturers?
- ❑ Better Than
- ❑ As Good
- ❑ Not as Good

Additional Comments: _____
_____
_____
_____
_____

Cut Along Dotted Line

Fold along dotted line

Post Office will not deliver without proper postage

Global Hobby Distributors
Attn: Wattage Customer Care
18480 Bandilier Circle
Fountain Valley, CA. 92728

Fold along dotted line